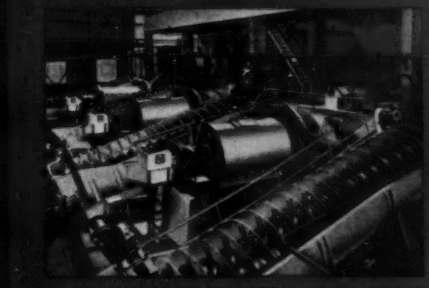
The Mining Journal

LONDON, APRIL 25, 1958

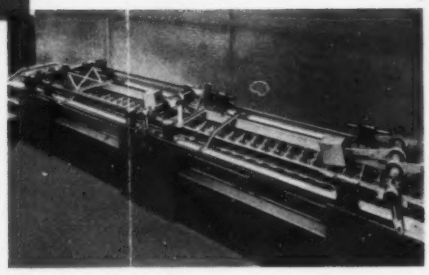
Vol. 250. No. 6401. Price Ninepence



CLASSIFIERS

engineering for world industry

LOWDEN DRYER



MINE HEADFRAME

BALL MILL

HEAD WRIGHTSON DESIGN AND MANUFACTURE PLANT & EQUIPMENT FOR THE MINING INDUSTRY

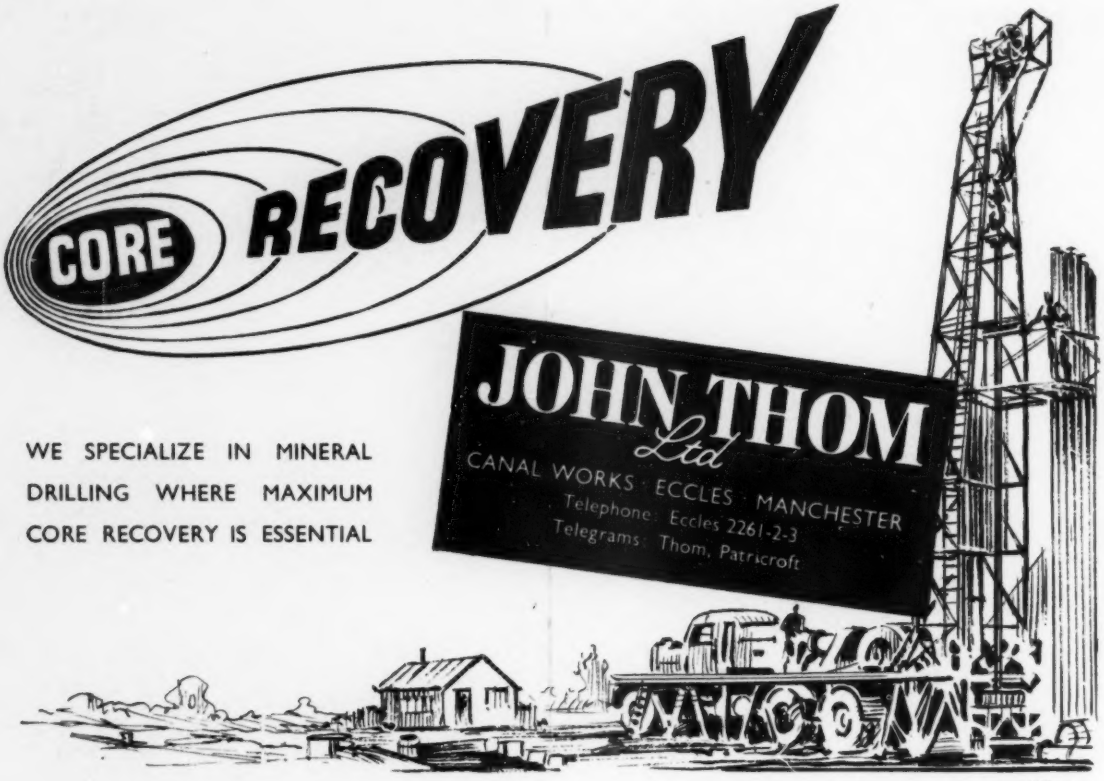
HEAD WRIGHTSON & CO LTD

THORNABY-ON-TEES STOCKTON-ON-TEES MIDDLESBROUGH LONDON JOHANNESBURG TORONTO SYDNEY CALCUTTA

CORE RECOVERY

WE SPECIALIZE IN MINERAL DRILLING WHERE MAXIMUM CORE RECOVERY IS ESSENTIAL

JOHN THOM Ltd
CANAL WORKS · ECCLES · MANCHESTER
Telephone: Eccles 2261-2-3
Telegrams: Thom, Patricroft



L9514

THE

LIFEGUARD

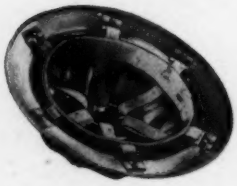
THE Safety First

The ONLY Industrial Safety Helmet that carries the Kite mark

(*B.S.I. Licence No.* 2820)—*your guarantee that it has passed the stringent safety tests laid down in B.S.* 2862 : 1957 *for Industrial Safety Helmets* (*Heavy-duty*).

Die-stamped from tough aluminium alloy and ribbed for greater strength, the Panorama 'Lifeguard' is the all-purpose heavy-duty Safety Helmet that combines maximum strength with extreme lightness. The adjustable leather harness is fully suspended to provide maximum shock absorption and can be altered quickly to fit all head sizes. Aluminium snap-on clips are an important feature and the harness is fitted with a heavy-duty webbing chinstrap.

The 'Lifeguard' is designed for comfort — the lightweight comfort that ensures full-time usage and full-time protection. It is the Safety Helmet that men are ready and willing to wear.



PANORAMA

PANORAMA EQUIPMENT LIMITED
PANORAMA EQUIPMENT (EXPORT) LTD

29/36, SEYMOUR MEWS, WIGMORE ST., LONDON, W.1. Telephone WELbeck 2871

The first diamond Rotary drill

The first rotary drill using the diamond as the cutting agent was the invention of a civil engineer in Paris during 1863. Rudolph Leschot had been a watchmaker and knew the superlative hardness of the diamond. His choice of it as a cutting agent therefore was logical and practical. The drill was first used in driving Mount Cenis tunnel in 1864.

A lot of water has flowed under the bridges since that early invention. An important industry has grown from it and today diamonds are searching the depths of the earth for all the valuable minerals hidden within the strata of its crust.

Smit's have been leaders in the development of the diamond drill for mining purposes since its inception. They were the first to use small diamonds or bortz in the crown of mining drills. That development has set the pattern of today's mining bits.

There is a range of Smit Mining Bits from which the difficulties of most formations and conditions can be met with profit to the driller. It will pay you to consult Smit's on any problem of drilling.

J. K. SMIT & SONS (DIAMOND TOOLS) LTD.

Mining Division: 22-24, Ely Place, Holborn Circus, London, E.C.1

Telephone: ★ HOLborn 6451

European, American and Canadian Offices:

J. K. Smit & Zonen Diamantgereedschappen (Diamond Tools) N.V., Sarphatistraat 66, Amsterdam (C), Holland
J. K. Smit & Fils, S.A., 28-30, Rue du Docteur Bauer, Saint Ouen (Seine), France
J. K. Smit & Sons, Inc., Murray Hill, New Jersey, U.S.A.
J. K. Smit & Sons of Canada Ltd., 129, Adelaide Street West, Toronto, 1

FOR STRIPPING, MINING AND QUARRYING—

Modern Excavating Equipment

The 110-RB 4½ cu. yds. heavy-duty mining and quarrying shovel (illustrated) and dragline diesel-electric or full electric with Ward-Leonard control, are outstanding examples of the progressive policy of Ruston-Bucyrus in a specialised field where arduous digging is normal. The 110-RB is designed from tracks to teeth for outstanding strength and maximum efficiency. Each part has been evolved in the light of wide experience, and whilst many of the 110-RB's outstanding features are innovations as far as machines of this class are concerned they have, nevertheless, been fully tried and tested under the severest operational conditions the world over.

RUSTON-BUCYRUS

RUSTON-BUCYRUS LIMITED, EXCAVATOR SPECIALISTS, LINCOLN

THE COMPLETE RANGE OF RUSTON-BUCYRUS EXCAVATORS IS FROM ¾ TO 6 CUBIC YARDS CAPACITY

Greater loads . . higher lifts . . longer flights with

GOODYEAR

RAYON CONVEYOR BELTS

A full range of rayon-carcass conveyor belts is available from Goodyear for applications where higher tension ratings are desirable. The special advantages of Rayon belts make possible a fresh approach to new installations, and also help to eliminate many difficulties with existing installations.

Manufactured in three different weights of rayon and to a wide variety of cover specifications, we are able to supply the most economical belt for any type of service. With knowledge of your operating conditions we will gladly advise on the Goodyear rayon carcass belt best suited to them.

Greater Efficiency

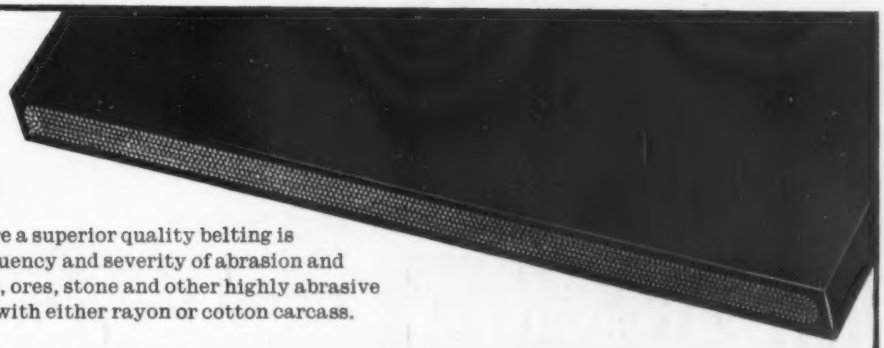
Higher tensions, with ample safety factor and less stretch, permit greater loads, longer flights and higher lifts. This means simpler layout, fewer transfer points and easier sequence control.

Better Troughing

The thinner construction ensures better troughing and less dead weight on highly-rated belts. The higher grades of rayon belting have ratings away above anything that is practical in cotton construction, and yet trough perfectly.

Longer Belt Life

Extra flexibility means that belts can wrap driving rollers and snub idlers more closely, yet retain the excellent impact resistance needed for loading points. Belts therefore last longer.



STACKER

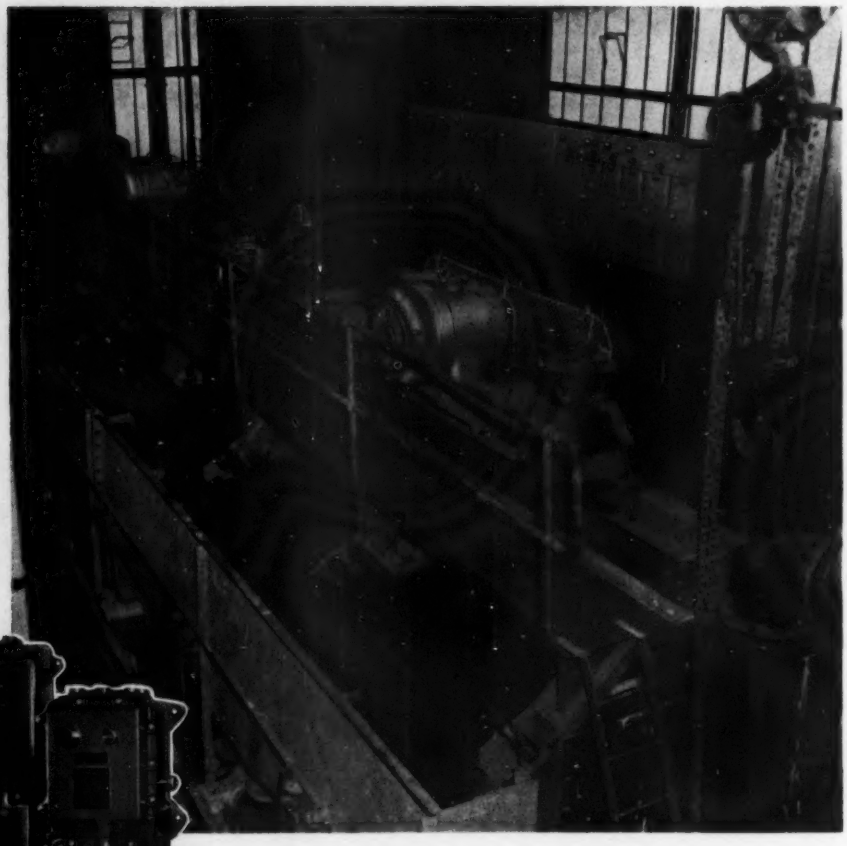
Designed for use where a superior quality belting is demanded by the frequency and severity of abrasion and flexing. Ideal for coke, ores, stone and other highly abrasive materials. Available with either rayon or cotton carcass.

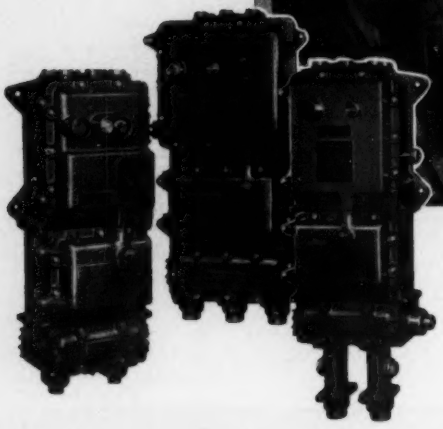
GOODYEAR

INDUSTRIAL RUBBER PRODUCTS

CONVEYOR BELTING • HOSE • V-BELTS • TRANSMISSION BELTING • FENDERS

On the surface, or below ground, whatever the application, there is an Allen West starter for every electric motor





Above—Multi-starter switchboard controlling Unifloc separators at the Betteshanger Colliery of the National Coal Board, South-Eastern Division. *Left*—Typical examples from the comprehensive range of standard starters—fully "Buxton" certified.

ELECTRIC MOTOR CONTROL GEAR

for Winders
Haulages
Coal Preparation and Handling Plant
Coke Ovens and By-products Plant
Pumps and Fans
Electric Locomotives
Workshop and Pithead Services also
High Voltage Distribution Switchgear

ALLEN WEST

ALLEN WEST & CO LTD BRIGHTON ENGLAND · Telephone: Brighton 23291 · Cables: Control, Brighton
Engineers and Manufacturers of Electric Motor Control Gear and Switchgear
SUBSIDIARY COMPANIES IN CANADA, SOUTH AFRICA AND RHODESIA · AGENCIES THROUGHOUT THE WORLD

conveyed safely

To convey safely *care* has to be taken; and with conveyor belting the right point at which *care* should be taken is at the design, development and manufacturing stages. After that it should take *care* of itself, the people who work with it and the load it carries. The unique research and manufacturing facilities of Rubber Improvement Ltd. make certain that Leonex P.V.C. Multiply Conveyor Belting is produced with such *great care* that long life, dependability and safety are ensured.

LEONEX "Green for Safety" P.V.C. Conveyor Belting, standard quality (32 oz. duck) and super impact resistant quality (42 oz. duck).
RILON "Green for Safety" flexible and high tensile belting, incorporating high tenacity rayon.

LEONEX
Green for safety
P.V.C. MULTIPLY ANTI-STATIC FIRE-RESISTANT
CONVEYOR BELTING

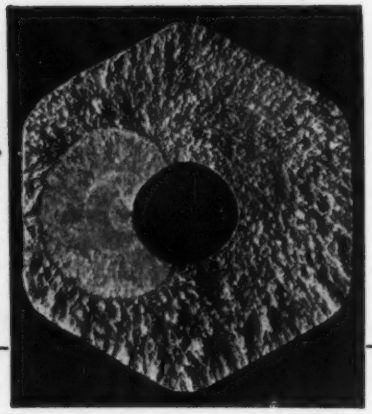
ANOTHER RIL PRODUCT

RUBBER IMPROVEMENT LIMITED
Rilex Works · Wellingborough · Northants · Tel: Wellingborough 4033

The steel with up to 50% longer life!

New anti-corrosion treatment stops premature breakdowns such as this

On untreated drill steels corrosion sets in early around the flushing hole, wearing out the steel before its time.



Corrosion has been responsible for the premature breakdown of untold numbers of drill steels. Now, from Sandvik, the world's largest manufacturers of integral steels, comes a new 'Coromant' steel well and truly protected against it. Those who have already tried out Coromant SR-treated steels report that their resistance to corrosion lengthens their life up to 50%.

At no extra cost to you, all new Sandvik Coromant steels—flushing holes as well as the outsides—have been subjected to an anti-corrosion treatment which protects the steel during transport, storage and actual drilling. (It is worth noting that the treatment of the flushing hole has been done in such a way that the diameter of the hole is the same as before, so retaining full and effective flushing and a maximum rate of drilling).

To complete the protection of the steels during transport and storage, Sandvik Coromant SR-treated steels are fitted with air-tight plastic caps on both the bit and collar.

Sandvik Coromant SR-treated steels are another step towards lower drilling costs. When fitted to an Atlas Copco rock drill you have an unbeatable drilling unit, for both were developed to work together. No drill or steel developed separately could ever give such equivalently high performances. In ten years Atlas Copco drills and Coromant steels have become the world's most widely used drilling unit, responsible for the drilling of no less than one billion feet per year.

Sandvik Coromant SR-Treated Steels

For further details of the equipment featured here, contact your local Atlas Copco Company or Agent. If you have any difficulty, please write to:—Atlas Copco AB, Stockholm 1, Sweden or Atlas Copco (Great Britain) Ltd., Beresford Avenue, Wembley, Middlesex.

Atlas Copco —*Manufacturers of Stationary and Portable Compressors, Rock-Drilling Equipment, Loaders, Pneumatic Tools and Paint-Spraying Equipment*

1958 PARTICIPANT BRUSSELS WORLD FAIR

The Mining Journal

London, April 25, 1958

In this issue . . .

Steel in the Common Market	467
Turkey's Chrome Industry	468
Royalties on Westralian Minerals	468
Recession Hits Malaya's Iron Mines ...	468
First Shipments From Avoca	469
Non-Ferrous Metals in the U.S.S.R. ...	469
Power Station for New South Wales ...	469
The Ripple Rock Project	469
Penarroya's World-Wide Interests	470
Mine Expansion in Nevada	471
A Method of Improving Filtration Practice	472
Developments in Handling Fume	473
Mining Miscellany	475
Machinery and Equipment	476
Technical Briefs	478
Metals and Minerals	479
London Metal and Ore Prices	480
Mining Finance	481
Company Announcements	483
Publications Received	486
Metropolitan-Vickers in 1957	488

Vol. 250 **No. 6401**

Established 1835

Joint Editors
U. Baliol Scott R. Bruce Dunfield

News Editor A. G. Thomson
Assistant Editor R. Bowran

Display Advertisement Manager
E. S. Hooper

Circulation
Robert Budd

Published each Friday by

THE MINING JOURNAL LTD.

Directors

E. Baliol Scott (*Chairman*) U. Baliol Scott (*Managing*)
G. A. Baliol Scott R. A. Ellefsen

15, WILSON STREET, LONDON, E.C.2

Telegraphic Tutwork London
Telephone MONarch 2567 (3 lines)

Annual Subscription £3 **Single copy ninepence**

Steel in the Common Market

AT its birth five years ago, the European Coal and Steel Community was hailed as a bold and imaginative experiment in international co-operation, which has been triumphantly vindicated by subsequent events. It may not be generally realized that by the end of the quinquennium the six member States of the Community had achieved an output of steel bigger than that of the Soviet Union and second only to that of the U.S. Not only has the rate of expansion been more rapid than anywhere else in the world; trade in iron and steel between the member countries has increased by 160 per cent, there has been a huge expansion of the export trade and investment in the steel industry, already at a high level, reached its highest peak in 1957.

These impressive achievements have won many converts to the idea of still closer economic, political and military integration. Though still under discussion, proposals for the establishment of a European Free Trade Area over a much wider field are already far advanced, and since British participation in the new movement is now being actively canvassed — and indeed is favoured by the British steel interests—the British Iron and Steel Federation has appropriately devoted the whole of the current issue of its quarterly *Review* to a detailed examination of the historical background of the Community and its impact on the course of world trade.

One of the most decisive results of the establishment of the supra-national authority has been the elimination of customs barriers and the establishment of free access to mineral supplies throughout the pool area. Formerly, Germany had plentiful coal reserves but inadequate iron ore supplies while France had iron ore to spare but not enough coal. In the same way Luxembourg had ore but no coal, the Saar had coal but no ore and Belgium was short of both. There are substantial grounds for the belief that these inequalities, now eliminated, were a significant factor in the territorial ambitions and disputations in the European scene during the past century.

From time to time strains and stresses have developed in consequence of the rigidities of prices in the common market. There are, in fact, still wide discrepancies but it must be emphasized that these were the results obtained in conditions of high demand. The recent easing of the market is encouraging competition within the Community and closer levels of prices.

In the distribution of their steel trade, there are significant differences between the U.K. and the Community. Roughly 30 per cent of the exports of the Community are directed to other Community countries and a further 16 per cent to the rest of the Free Trade Area. On the other hand, the U.K. sends only 6 per cent of her steel exports to E.C.S.C. countries and 11 per cent to other Free Trade Areas, whereas 57 per cent of her exports go to the Commonwealth.

Turning to the proposed Free Trade Area, which will embrace many other European countries outside the Community, the *Review* estimates that the aggregate steel production would be about 80 per cent of that of the U.S. and about 50 per cent greater than that of the U.S.S.R. Its population (240,000,000) would

actually exceed both that of the U.S.S.R. (200,000,000) and the U.S. (170,000,000). Even more important it would be by far the biggest exporter, accounting for some 70 per cent of the world total in 1957.

From the foregoing it will be seen that there have been very decisive changes since the British Government decided to hold aloof when the E.C.S.C. was originally constituted. The boundaries of the new European Common Market will be very much wider and the conclusion of the British Iron and Steel Federation is that the determining factor must be the undesirability of the steel consuming industries having to compete in Western Europe over tariffs which do not apply to German and other Community producers.

Some 20 per cent of British steel consuming industries' exports are sold in Western Europe and the steel industry is much concerned that this valuable export trade should not be jeopardized by a refusal to associate with the Free Trade movement.

TURKEY'S CHROME INDUSTRY

Chrome ore has been the mainstay of Turkish mining ever since the British company, Stanley Paterson, established at Izmir (Smyrna), started extracting the ore, producing the metal and exporting both ore and metal more than a century ago. For many years the company owned most of the chrome mines then known in Turkey. The majority of them have been taken over by the Eti Bank, the State bank which now controls the majority of Turkish mining activities.

The most important chrome mine, the Guleman mine, worked by the Shark Krom Company, a subsidiary of the Eti Bank, is located in south-eastern Anatolia, to the north-west of Diyarbekir, and is connected by a 13-mile ropeway with the nearest railway station, Ergani Maden, which also serves the country's most important copper mine (Ergani). In all, there are about a dozen mines in operation at the present time. Apart from the Guleman, those inland from the Gulf of Fethiye (to the south of Izmir) derive their existence from French interests, although controlled by the Eti Bank. There are also mines near Marmaris, a coastal place to the north-west of Fethiye, and near Burdur (to the north of the southern port of Antalya), both originally associated with London and Scandinavian interests, which rank among the largest chrome mines in Turkey.

The Guleman mine has been responsible for about one-third of the country's entire output of chrome ore. Most of it is high-grade ore (averaging 48 per cent of Cr_2O_3), but low-grade refractory ore is also being produced, for instance, by certain mines near Eskishehir (to the west of Ankara) or near Iskenderun, the country's main port near the Syrian frontier.

For many years after the last World War the Turkish output of chrome ore was unaffected by world demand, since the United States regularly absorbed about 90 per cent of the production. Subsidies for the modernization and extension of chrome mining were repeatedly obtained from the United States, and the output of chrome soared from 117,975 tonnes in 1947 to 451,566 tonnes in 1949, reaching 805,000 tonnes in 1952. Expanding competition from Pakistan, Rhodesia and South Africa, with an average price of $45 per tonne c.i.f. New York resulted in a falling-off of orders from the States and other countries inclusive of the U.K. The high Turkish price of $52 per tonne c.i.f. New York, was justified from the Turkish point of view by high transport charges (the mines being at considerable distances from their nearest ports of export—there are about 480 miles between Ergani and Iskenderun to quote but one example). At such prices, however, Turkish chromite ceased to be attractive and the ensuing adjustment involved a reduction in the proceeds from chrome exports from £T78,000,000 in 1953 to £T55,000,000 in 1956 (£1 Sterling=£T7.87), a fall of nearly 30 per cent.

Between 1953 and 1956 exports of chrome contracted from 900,000 tonnes to 480,000 tonnes, and chrome exports, though still prominent within the general position of the country's economic activities, now account for only 6 per cent of Turkey's total exports. The total export value amounted to £T693,000,000 for the first nine months of 1957.

ROYALTIES ON WESTRALIAN MINERALS

Hitherto, Western Australia has not imposed royalties on minerals produced, but in future royalties will be charged on all minerals other than gold, coal and oil.

The charges proposed will be as follows: All minerals which are used in their native state and have a value less than £A10 per ton, will be charged 6d. per ton. This rate will apply to barytes, bauxite, bentonite, clay, dolomite, felspar, gypsum, glass sand, magnesite, ochres, talc and vermiculite. Minerals usually sold as concentrates, such as graphite, ilmenite, pyrite, phosphates and zircon, with a value below £A10 per ton, will be charged a royalty of 1s. per ton of concentrate. When the value of the concentrates is between £A10 and £A50 per ton, the royalty will be 1s. 6d. per ton, applicable to copper (for fertilizers), chrome, iron ore, manganese, rutile and glauconite.

Other minerals and concentrates marketed by the ton, such as asbestos, beryl, copper, lead, monazite, tin and zinc will be charged a royalty of 2s. per ton, but because of the low price for lead and copper, it is not proposed to impose a charge on these minerals at present. Minerals of high value, such as tantalite, columbite, mica and scheelite will pay a royalty of ½ per cent of the value of the mineral.

RECESSION HITS MALAYA'S IRON MINES

Iron ore production in the Federation of Malaya reached a new peak in 1957, in spite of exceptionally severe monsoon weather on the East Coast during December, when the output was about 50 per cent below the average monthly figure. The year's production was 2,972,359 tons, an increase of 527,789 tons over 1956, and the highest since the war.

Exports jumped by 543,252 tons to 2,919,737 tons, an all-time high. Nearly the whole tonnage went to Japan. The Netherlands received 24,968 tons, Formosa 18,000 tons and Thailand 110 tons.

The outlook for 1958 is gloomy. Production has been curtailed, development plans are being retarded and an earnest search for new markets is being made. Japanese steel mills have decided to cut their iron and steel production for 1958, in consequence of the world-wide economic recession. All Japanese mills are reported to be holding large stocks of iron ore. Although a spokesman of the Japanese Consulate-General's office in Singapore recently stated that the reduction of Japanese imports of iron ore from Malaya would be small, the producers take a different view.

Eastern Mining and Metals Ltd., the $M50,000,000 proprietor of Malaya's largest iron mine in Dungun, Trengganu, has decided to review the development programme of its new multi-million dollar mine in Rampin, Pahang. This mine, which will eventually be as big as the one at Dungun, was scheduled to come into production later this

year. A company official has said that so much money had already been spent on prospecting and preliminary work on the new mine that the project would have to be continued, but it was now doubtful whether production would be commenced until some time next year. Meantime, production on existing mines would be scaled down and workers would have to be put on short shifts unless new markets can be opened.

The Tambun Mining Co., which operates an iron ore mine near Ipoh, is reported to have shipped its entire stockpile of 100,000 tons to the Netherlands.

As long as the freight rates remain at or below the present level there would seem to be good prospects of selling a good proportion of Malayan iron ore in Europe.

FIRST SHIPMENTS FROM AVOCA

The first shipments of copper ore from Avoca, County Wicklow, are due to go out early in July to Sweden for smelting. All shipments will be from the nearby port of Arklow, where a harbour improvements scheme, costing £80,000, is nearing completion.

The installation of heavy machinery in the processing mill on the Avoca site is almost finished. The mill will comprise four primary crushers and three secondary crushers geared to reduce the ore to powder before the copper sulphites are floated and the ore concentrated. So far, over 100,000 tons of ore have been stockpiled close by the mill, and the plant, when in operation, will handle 4,000 tons per day, giving an extraction of 100 tons of copper and 400 tons of pyrites containing sulphur. Forty per cent of estimated pyrites output will be sufficient to meet Eire's needs in sulphuric acid for the fertilizer industry. Sulphur will also be exported to Belgium.

Diamond drilling is still being carried out on both sides of the Avoca river to determine the extent of the mineralization belt where the mine lies. The Avoca Mines, operated by the Saint Patrick Mining Co. Ltd.—a subsidiary of the Mogul Mining Corporation of Toronto—will be the largest copper mine in production in Western Europe.

NON-FERROUS METALS IN THE U.S.S.R.

It has been reported in the Soviet industrial Press that Russian nickel is found mainly in the Urals near Sverdlovk and Chkalov and in the Murmansk peninsula at Pecheny and Monchegorsk. Some 77 per cent of known nickel ore deposits are sulphides and 23 per cent are silicates. The silicate ores tend to have a higher nickel content than the sulphides. Nickel yield from silicates accounts for 36 per cent of total nickel production, while extraction from sulphides accounts for 64 per cent.

Tin-bearing ore is found in Yakutia (Siberia), in Kazakhstan and in the Novosibirsk region. The metal is extracted from sulphides, quartz with veins of tin and from pegmatites. Ore production and metal extraction figures are (in per cent of total):

	Ore production	*Metal extracted*
Sulphides	80	95.5
Quartz	19	4.0
Pegmatites	1	0.5

It is stated that the Soviet Union is the world's second largest wolfram producer, with China holding first place. The main wolfram deposits are situated in Kazakhstan, in Buriat-Mongolia, in Kabardino-Balkaria, Tadshikistan and Kirghizia. Some 61 per cent of Soviet wolfram is extracted from outcrops where calcareous minerals are in contact with magmatic minerals, 37 per cent from quartz and the remainder from various other minerals. The wolfram content of Soviet ores, however, is low and, therefore, there is an enrichment problem which has not been solved to full satisfaction so far. Until such a solution is found the costs of wolfram extraction will remain high.

There are a number of large bauxite deposits supplying the aluminium smelters. The main deposits are located in the Urals, in central Kazakhstan, in the Vologda and Leningrad districts of European Russia, in the Ukraine, in western Siberia and in the Krasnoyarsk district of eastern Siberia. Attempts are also being made to exploit other aluminium-bearing minerals such as nephelites which have been found in the Murmansk peninsula and alunites and andalusites which have been discovered in Azerbaidzhan. According to reports a method for extraction of aluminium from nephelite has been developed and is already being used.

POWER STATION FOR NEW SOUTH WALES

The New South Wales Electricity Commission has announced plans to establish a £A65,000,000 power station in the vicinity of the coalfield in the Lake Macquarie area. A large-scale drilling programme is under way to test the quality of the deposits and the Commission is expected to open up a market for 2,500,000 tons of coal a year. This will come as a welcome fillip to the Australian coal industry and is another example of the current swing away from oil-fired stations.

The first unit of the station is scheduled to be in operation by 1963 and when completed the station will have a generating capacity of 800,000 kW. It is intended ultimately to provide a second power station of similar capacity at a site to be selected.

According to *Overseas Review*, coalfields in Southern Rhodesia are now being investigated as part of the long-term prospects of the industry. The well-known Wankie field is expected to have a life of 150 years and although other fields do not approach this field in quality, they can be regarded as potential producers of coal for such uses as in power stations and hydrogenation plant.

THE RIPPLE ROCK PROJECT

Earlier this month the traditional mining methods of shaft sinking, developing and raising, were used in sequence to clear a notorious hazard from a shipping lane off the coast of British Columbia. The hazard, Ripple Rock, in the Seymour Narrows 100 miles from Vancouver, was eliminated at 9.31 a.m. on April 5 in the largest man-made, non-nuclear explosion in history. Since 1875 the Rock has taken a toll of 120 ships and 114 lives.

In the mining operation a 570-ft. shaft was sunk on Maud Island 1,400 ft. from Ripple Rock, a tunnel 2,400 ft. long was then driven under the Narrows to the Rock, and a 300-ft. raise was lifted almost to the apex of the Rock peak.

In the blast itself, a total of 2,749,824 lb. of explosives removed 370,000 tons of rock and 320,000 tons of water and allowed for 47 ft. of clear water above the peaks at low tide.

The twin peaks that formed Ripple Rock were 3,000 ft. long, 1,500 ft. wide at base, and rose between 325 ft. and 400 ft. from the sea bed. At their highest point they reached to within 9 ft. of the surface at low tide.

A full description of the Ripple Rock project has been received from our correspondent in Canada, and will appear in a forthcoming issue.

Penarroya's World-wide Interests

Established with French capital in 1881 to exploit important mineral reserves in the Spanish Province of Andalusia, the Société Minière et Métallurgique de Penarroya de Rothschild Frères founded its fortune on lead and zinc, which still remains its largest field of interests. Recently, the company has branched out into an entirely new sphere, namely that of copper.

PENARROYA enjoyed great prosperity during the forty years that it was recovering lead and by-product zinc from its various mines in Spain. During this period alone five large mines yielded 2,500,000 tonnes of lead and zinc concentrates, the returns to the company from their high-grade deposits reaching perhaps as much as Frs.100,000,000,000 (actual).

For 15 years Penarroya's activities in Spain, cradle of the company and long its chief source of prosperity, were largely paralysed by the general situation. Last year, however, a start was made at Cartagena on the exploitation of a new deposit, expected to become Spain's largest mine.

In 1913, the company decided to extend its activities outside of Spain. As and when opportunity occurred, it has gained a footing in other Mediterranean countries from France itself to North Africa and Greece, and its interests have spread across the Atlantic to South America. The following is a brief summary of Penarroya's main activities.

Territorial Interests

France: Penarroya owns the Pierrefitte mine (Hautés Pyrénées), which now appears to be approaching exhaustion; in 1956 it produced 1,640 tonnes of galena and 6,800 tonnes of zincblende. Penarroya also controls the Société des Mines de la Plagne (Savoy), with reserves of galena sufficient for at least ten years at the present rate of extraction; and the Société des Mines des Malines (Gard), Metropolitan France's most important zinc producer, which in 1956 produced 1,500 tonnes of galena and 6,000 tonnes of zincblende.

At Noyelles-Godault, the largest Penarroya works in France, 1,200 workers are employed in a variety of plants including *inter alia*, a zinc refinery and the most important lead refinery in Europe with an output (in 1956) of 63,000 tonnes of lead and 50,000 kg. of silver. Among the company's other interests in France are its works at Estaque, where cobalt ores from the Bou-Azzer mine in North Africa are roasted.

Morocco: The activities of Penarroya's subsidiary, the Société Penarroya-Maroc fall into two categories; the first comprises those mining ventures which are under the parent company's direction and send most of their output to Noyelles-Godault, and the second, companies in which Penarroya has an important financial or technical participation. Among the former are the Beni-Tadjit mine, with an output of galena now amounting to 8,000 tonnes annually, and a number of affiliated companies. Prominent among the subsidiaries is the Société Mines d'Aouli, whose deposits at Aouli-Mibladen yielded 30,000 tonnes of galena in 1956, a rate of extraction which could be maintained for 20 years, based on the present known reserves. Other affiliates include the Société des Mines de L'Adrar (6,000 tonnes of galena in 1956) and the Société Minière de l'Atlas Marocain.

In the second category of interests is the Société des Mines de Zellidja, in which Penarroya-Maroc with 10 per cent of the equity is the largest minority holder. Zellidja is exploiting one of the largest deposits in the world and sends its output almost entirely to the neighbouring lead smelter at Oued-el-Heimer. This smelter is operated by the Société des Fonderies de Penarroya-Zellidja, which is jointly owned by Penarroya-Maroc and the Société des Mines de Zellidja. Under Penarroya's technical direction, it treated 46,000 tonnes of galena in 1956 and produced 28,000 tonnes of lead.

Tunisia: Penarroya's principal establishment in Tunisia is a lead smelter at Megrine with an annual capacity of 26,000 tonnes, which derives its ore supplies only partially from mines under Penarroya's control. The Penarroya portfolio also includes an important holding in Djebel-Hallouf.

Algeria: Operations at the Djebel-Ichmoul mine, which produced about 2,000 tonnes of galena a year, were suspended for political reasons at the end of 1954. Apart from this property, Penarroya's activities in Algeria are confined to exploration, the most hopeful prospects being those at Ghar-Rouban and Cavallo. At the Ghar-Rouban mine, on the Algerian-Moroccan frontier, the mineralized zone presents analogies at depth with the deposit at Touissit-Zellidja. At Cavallo, near Djidjelli, on the coast, exploration has been concentrated on two deposits, one being an occurrence of copper with known reserves estimated at 700,000 tonnes averaging 2.8 per cent, and the other a complex ore assaying 3.4 per cent lead, 3.1 per cent zinc and 0.8 per cent copper, the reserves being estimated at 1,000,000 - 2,000,000 tonnes. Exploitation of both mines depends on an improvement in the situation in Algeria.

Mauritania: Penarroya owns 12 per cent of the capital of the Société des Mines de Cuivre de Mauritanie (MICUMA), which is under its technical direction. This company was formed in 1953 to exploit a deposit of copper at Akjoujt, 400 km. south-east of Port Etienne, which could be worked by opencast methods. The reserves are estimated at 20,000,000 tonnes of sulphide mineral averaging 1.5 per cent copper, as well as 9,000,000 tonnes of oxide presenting difficult concentration problems.

Other Activities in Europe

Spain: In 1945, Penarroya's interests in Spain were completely re-organized, with the double objective of liquidating certain ancillary undertakings—for the most part operating at a loss—and embarking with new resources on intensified exploration for lead and zinc. The first part of this programme is under way. The second centres round the exploitation of the deposit at Cartagena, with estimated reserves of 1,000,000 tonnes of lead, which is expected to become the largest mine in Spain. In 1956, it provided 15,000 tonnes of metal, surpassing the outputs of the two old-established smelters of Penarroya and Linares, which together produce about 20,000 tonnes a year. This mine alone will ultimately yield 24,000 tonnes of galena a year, at which rate extraction is assured for at least 30 years.

Other undertakings in Spain owned or controlled by Penarroya include the Puertollano coal mine, which in 1956 produced 750,000 tonnes of high quality coal; and Seville Sulphur, which operates a pyrites mine at Aznalcollar, its output in 1949 amounting to 49,000 tonnes.

Penarroya's Italian interests spring from the Société Mineraria e Metallurgica di Pertusola, with a capital of 2,280,000,000 lira. The activities of this subsidiary are traditionally centred on a group of mines in Sardinia, whose output is treated at the La Spezia smelter (lead) and the electrolytic refinery at Crotone (zinc).

Apart from 1,000,000 tonnes of run-of-mine ore, extracted in 1956, the mines in Sardinia have yielded 24,000 tonnes of galena, 30,000 tonnes of zincblende and 17,000 tonnes of calamine. The mines and plants are technically very efficient. The Sardinia deposits, exploited for a hundred years, have only moderate values, but are sheltered by tariff protection. The known reserves are sufficient to support production for a further ten years at the present rate of extraction and are being increased.

In Greece, Penarroya, though an 80 per cent holding, controls the Compagnie Francaise des Mines du Laurium, whose mine has been known and exploited since the days of Ancient Greece. In 1956 it produced 3,300 tonnes of galena and 4,500 tonnes of zincblende.

Penarroya's wide network of interests in Europe extends to Britain and Switzerland. Through its important minority holding in H. J. Enthoven and Sons, the company is associated with one of the leading firms in the British metal industries. In Switzerland, it has equal shareholdings with Minerais et Métaux and the Demierre family in two industrial and commercial companies.

Penarroya's South America interests are mainly in the Argentine and Chile, but also extend to Uruguay and Brazil. The group has been established in the Argentine for 40 years through Compania Argentina Metalurgica Estano Aluminio (Camea), which processes annually 2,400 tonnes of aluminium, 1,000 tonnes of copper, and 500 tonnes of zinc. In 1951, Penarroya founded, with M'Zaita (in which it now has a 21 per cent interest), the Compania Minera del Plomo (Comiplo), which undertakes mineral exploration in Pategonia. In the same year, an agreement was concluded with M'Zaita for technical assistance in bringing to production some copper mines in Chile belonging to the latter company, notably that of Soldado.

Exploration and Development

Despite the unfavourable world market for its principal metal products, lead and zinc, Penarroya has announced that its development programme will be continued. The company spends Frs.400,000,000 a year in raising production capacity and locating new ore reserves. Its reserves, formerly estimated at about 16,000,000 tonnes of ore, are now placed at three times that level.

Apart from the important Cartagena project in Spain, development work is in progress in four countries. In France, output of lead and zinc at the Malines mine has so far been doubled, and work has started at Saint Sebastien d'Agrefeuille on deposits containing proved reserves of 3,000,000 tonnes of lead ores. In 1956, the company acquired control of two French mining companies with lead and zinc interests, namely the Société des Mines de Pegrebrune and the Société Minière de la Loubatière.

In Italy, the company has enlarged its interests in Petrusbla, a leading mining company, while in Sardinia work is going on at Arenas, where known reserves of lead ore are between 2,000,000 and 2,500,000 tonnes.

New reserves found in Laurium, Greece, are leading to improved mining operations.

Further afield, in Iran, Penarroya has helped to form two lead mining companies which will undertake prospecting and exploration.

Mine Expansion in Nevada

NEVADA MINES DIVISION is currently completing two major projects in expanding its operations and has seen the completion of another. This project has been described in *Kennescope*, a publication of the Kennecott Copper Corporation.

The first project is the further development of the Deep Ruth Shaft. The existence of the Deep Ruth orebody was first made evident by churn drilling in the mine as early as 1937. In following years, a thorough examination of the orebody was made by more underground churn drilling, surface churn drilling, diamond drilling, and the driving of a prospect drift. This work verified the existence and the extent of the orebody, which contains some 22,500,000 tons of copper ore averaging about 17 lb. of copper to the ton.

Two shafts are being sunk, the Kellinske and the Deep Ruth. The Kellinske, an incline shaft, will be 2,245 ft. in length. It will provide ventilation and serve as another entrance and exit to the underground workings. The Deep Ruth will be about 1,600 ft. deep and will be the shaft through which the ore will be hoisted. The Kellinske and Deep Ruth shafts will be connected on three different production levels.

It will take about ten years to mine the available ore using the block caving system. This means outlining a block of ore and undercutting it until it caves. The ore will be brought to the surface by a powerful ore hoist that can raise skips loaded with 12 tons of material at almost 30 m.p.h. The ore from the Deep Ruth Shaft will supplement the Copper Flat Pit production.

Other Projects

The second project was necessitated by the fact that part of the town of Ruth was located directly over the area that will cave in as a result of Deep Ruth operations. Almost the entire town is being moved by Nevada Mines Division.

A further project was the engineering and construction of a new power plant made necessary by new mining ventures. The new power plant was completed and placed in operation on February 11, 1954. It has sufficient capacity to supply the electrical energy for an area of 40,000 population. However, its major function is to supply electrical energy for the mines and reduction plant. In addition, it supplies the power to Kennecott employees in Ruth and McGill, to Consolidated Copper Mines Corporation in Kimberley and to the Ely Light and Power Company in Ely, Nevada.

As a result of this expansion by the Nevada Mines Division, the available supply of electrical power in White Pine County has been doubled.

Engineering and necessary expenditure information for the power project were developed and presented to the Kennecott board of directors early in 1951. With their approval, specifications were written and bids were requested on the major equipment.

Major equipment consisted of a turbine generator, surface condenser, steam generator, feed water heaters, feed water pumps, electric switchgear, transformer equipment, and other auxiliary equipment. Actual installation of this equipment was started in May, 1953.

With the exception of the steam generator, all installation work was accomplished by Nevada Mines Division employees.

The present fuel consumption of the power plant is approximately 225 tons/day of slack coal from Utah fields.

A Method of Improving Filtration Practice

Filtration is sometimes troublesome due to one or more of the following causes, namely: low filtration and/or wasting rate due to blinding of filter medium; poor cake discharge resulting from formation of a sticky cake, too thin a cake, or blinding; high filter media costs due to short life; and blowback of filtrate when discharging, because insufficient air passes through the cake to clear the draining area and the filtrate lines. To overcome some of these difficulties several modifications have been tried, such as blowback under feed slurry and snap-blow cake discharge, but are not always completely efficient. Improved cake discharge has been obtained by using a roller which tends to lift a sticky, clayey cake simply by adhesion to the roller and by using string discharges which lift the cake. The latter may tend to pull through the cake, however, and abrasive solids will cause heavy wear. To overcome some of these difficulties the Rotobelt filter has been designed by Eimco.

As compared with conventional drum filters, the Rotobelt offers the advantages of a clean, non-blinded medium at all times to achieve maximum filtration rate, ease of complete cake discharge, even with thin filter cakes, so that fast drum cycles can be employed to increase filtration rates further, and elimination of filtrate blowback. Other advantages arising from its use include the reduction of filter cloth wear to a minimum, as the scraper blade does not contact the medium, increase in effective area of the filter due to greater percentage of time under vacuum, and a decrease in down time for changing filter media as no calking or wire winding is employed.

There arises easy access to the filter deck for cleaning if necessary, as it is always exposed between the take-off and return point of the medium, as well as maintenance of as high a vacuum level as desired by the sealing method that prevents leakage.

The Basic Mechanism

In the basic mechanism of the Eimco Rotobelt filter, the endless belt passes over a discharge roll, and as the filter medium reaches the first point of a small radius of curvature, the cake is removed. A scraper blade set slightly away from the medium conducts the cake away in a continuous sheet. The small diameter roll allows the blade to be set very close to the surface without contact, since a horizontal line across the roll at the location of the scraper is equidistant from the scraper at all points as the roll rotates.

The medium is conducted under a wash roller that is partially submerged in a wash trough. A spray wash on either side of the medium permits thorough cleaning of each surface and any solids removed are recovered together with the wash fluid in the wash trough. In cases where the solids or the soluble material washed from the medium are valuable, effluent from the wash trough can be re-cycled to a convenient point upstream in the flowsheet. The blinding tendency of the solids or liquor with the particular medium employed will dictate the extent of spray washing required. In many cases only a periodic rinse is needed.

A return roller places the medium back on the drum. It has been found that the roller alignment system increases the percentage of drum area that can be employed for cake formation, washing and dewatering, thereby increasing effective area. On large diameter drum filters, it is possible to leave one-half to one entire additional sector of the drum under vacuum, thereby reducing cake moistures to a minimum at faster cycle times.

Both the discharge and return roller have self-aligning features, so that the medium is normally maintained in proper alignment on the drum. One roller is equipped with take-up screws at each end to correct for gradual belt stretching during operation. Any required adjustment is made very rapidly and without stopping filtration.

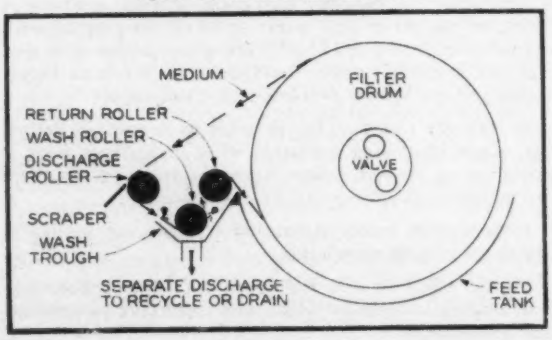
To maintain vacuum on the filter, obtain isolation between drum sectors, and prevent leakage, each division strip is fitted with a soft rubber insert that is slightly higher than the filter deck surface. Soft rubber inserts are also applied in the groove on each end of the drum. Finally, about 2 in. of the medium at each edge is impregnated with a sealing compound. This 2-in. band is kept in alignment with the rubber inserts on the drum ends so that a perfect seal is obtained. By this construction, each drum sector is completely sealed both from the atmospheric pressure side and the adjacent sectors. Thus, regulation of drying vacuum, separation of strong and wash filtrates, or any other operation performed on a conventional drum filter can also be achieved with the Rotobelt filter.

Initial Development

In the initial development of the Rotobelt filter, a specially constructed stainless steel belt was used as filter medium. This medium is so constructed that there is no flexing of the individual strands to cause eventual fatigue of the metal. However, in passing over the rollers, the strands will change position so that any embedded solids tend to work out and maintain the medium permeability. The metal belt was employed originally because it offered dimensional stability, lateral stiffness, and a permanent medium. These characteristics simplify the automatic self-alignment of the belt without unnecessary stretching.

Pilot plant studies have demonstrated that cloth media are superior to conventional cloth-covered drum filters, but because they lack dimensional stability and lateral stiffness, the alignment system must be modified. Full-scale tests are being conducted with cloth media to prove the required roller design. With the application of cloth media, it will be possible to handle any filtration problem that can be treated with continuous filtration.

Operation of the Rotobelt filter



Developments in Handling Fume

By C. C. DOWNIE

THE condensation and filtration of fume from different metallurgical activities represents a subject upon which somewhat elaborate details have already appeared. This ranges from settling chambers, bag filters, cyclone arresters, and film cleaners, to mechanical gas cleaners and electrostatic precipitators of different designs. Hence, as a repetition of this would not be justified, some attention might be given to the less well-known arrangements.

The filtering of gas attained most prominence in those countries where this has to be directly put to use for boilers and more particularly gas engines where the gas was expected to be clean. The experience so gained was soon applied to the less combustible gases from smelting hearths, and latterly developed by improved electrical filters, the incursion of which to some extent revolutionized fume cleaning. While this system holds appreciable advantages in occupying small space with minimum labour requirements, it does not suit all purposes, while for many years, until the original patent rights had expired, the costs were unduly high.

The result is that to day various combinations of different methods are adopted. (The original Pfoser-Strack-Stumm process permitted two generators to do the work of four or five units for an iron blast furnace, with corresponding reduction in radiation losses, which were considerable.) Some of the earlier refineries have been known to persevere with the method of conducting the gases into capacious sheet-iron dust flasks, from 33 to 80 ft. high, and 10 to 23 ft. in dia., and equipped with hurdles laid crosswise forming a network, with water sprinkled downwards from the top.

The disadvantages were large water consumption, and the conversion of all fume to a form of mud which required transference to settling ponds, while all heat was lost, although otherwise providing a simple and efficient gas-washer. A corresponding method obviated the large structures and gave similar results by adopting the centrifugal principle. Whereas the current of gas entrains the smallest particles of water in passing through the washers, and which particles remain suspended in the gas, the use of centrifugal force changes this. One of the centrifugal cleaners comprises a revolving screening drum sprinkled with water, and its action resembles that of grass blades in connection with condensation of the atmospheric moisture in its cooling effects. The water used requires to be as cold as possible, to make a success of this centrifugal system, but the total space occupied is small compared with the former dust flask arrangement.[1]

Another type of centrifugal cleaner comprises essentially a fan wherein water is injected according to a prearranged plan. By improving the distribution of the water inside the fan, this water consumption was improved, i.e., by fitting in the interior stationary and revolving radial disintegrator bars. Further improvements on the dynamical cleaners based on the wet process for blast furnace gases, resulted in another type of disintegrator by the same concern. This embodies the same principles as the previous fans but with still further reduced water consumption, besides improvements in the degree of purity of the resulting gas. It is claimed that whereas former disintegrators reduced the solid matter in gas to 0.0005 oz. per cu. ft., the improved model reduces this to 0.0002 oz. per cu. ft. (within 0.09 grain per cu. ft.).

An example is quoted of 1 litre of water being injected and reducing solid matter to 0.2 gr., while 1½ litres of water can reduce 3 gr. per cu. m. originally present, to a remnant of 0.015 to 0.02 gr. per cu. m. These wet cleaners are claimed to compete successfully with dry cleaners as a consequence.[2]

Arrangements of filter cloth equipment obviate high power and water consumption, besides the handling of sludges, etc., and appear to have been developed for certain blast furnaces using select porous cloth. The temperature of the furnace gases is reduced in a cooler, connected with a surface superheater, which serves to superheat the gases to prevent choking of the bags.

This does not mean the gases leave the superheater at a high temperature. They enter the filtering boxes at a temperature of some 70 deg. to 100 deg. C. while the filtering boxes contain 32 hoses, each 8 in. in dia. and 10 ft. in length. As the gas enters at the bottom, it passes through the filtering hoses, from the inside to the outside, thereby leaving the dust on the inside of the hoses, and again leaves the filtering boxes through suction flanges. Delivery pipes for the purified gas are connected to these flanges, while the action of fans assists the delivery of the gas.

As these cloth hoses lasted only about one year, alternative hoses of both metal and organic material are now substituted, which are claimed to give promise of unlimited durability. Since the filtering hoses get filled up with dust, and thereby restrict the passage of gas, they are cleaned at regular intervals of 8 minutes by shaking them mechanically, and then blowing gas through them in the reverse direction, and from whence the dust descends to bunkers. Conveyor worms then take care of this dust by removing it directly from the premises, without being given the opportunity to blow-off in its light condition.

The solid matter remaining in the gases is claimed to be reduced to 0.004 gr. per cu. ft., there are no settling ponds required as with wet sludges, and the total power consump-

tion measured on plants in actual operation is 0.05 h.p. per 1,000 cu. ft. of gas per hour. The main items of this layout comprise the cooler, surface superheater, filtering chamber, filtering hoses, suction flange, and fan.[3]

Alternative Wet Dust Collectors

The matter of substituting electric filters or electrostatic precipitators in place of different forms of wet washing plant has been the subject of no little controversy, since both of those systems hold specific advantages. This has to be viewed from different angles, since some smelteries with combined wet extraction plant want the acid liquors for lixiviation purposes, whereas others cannot get rid of the diluted gases fast enough, while on the Continent, the heat is utilized as fully as possible. Hence it could not be considered that wet condensing systems can be replaced by electric filters as a continuous line of natural development, as a consequence.

From another aspect, the purification of gases down to great degrees of purity is not considered desirable in the U.S.A. whereas this is essential in German smelteries. In so far as acutal removal of solid matter is concerned, the best designs of wet washers have not been surpassed by the electric system. This is borne out by some of the latest chimneyless boiler-houses being equipped with double electric filters, to make a certainty of removing all fine particles.[4]

Developments of electric filtering are being nevertheless followed with keen interest, even with those firms who operate large gas engines. Amongst improved lines of wet dust collectors are a set of towers with six dust impingement plates, while a seventh is designed for use as a water entrainment separator. This gathers the remaining moisture from the clean air before it is exhausted. Other features are a dirty-baffle under the first impingement plate, wearing strip reinforcing, an air directional baffle on the outlet side in the cyclone chamber, and a screened strainer on the sludge discharge line.

A further model holds the same operating advantages, but dealt with on a smaller scale. The fume is scrubbed five times by an impingement plate arrangement instead of thirteen times as in the large model. Fume-burdened air is drawn into the bottom of the tower, and in the sludge cone, heavier particles are immediately deposited. Air is drawn upwards through a turbulent spray of water, passing over two sets of impingement plates in its ascent, which scrub the air, freeing it from the remainder of the dust, which is deposited in the sludge cone at the bottom of the layout. This sludge is pumped to a dewatering tank, where the water is drawn off and re-circulated, while the air is dewatered by an entrainment separator and discharged. It is claimed that there is nothing to rapidly wear or break, no moving parts, dead zones, nozzles, or spray tips, and nothing which can clog or freeze, or necessitate adjustment, lubrication, or other maintenance.[5]

Notes on Electrostatic Precipitation

Regarding electric filters these have been today extended to multifarious uses besides handling fume and cleaning sulphur dioxide gases, since organic matter, fruit juices, milk, and other forms of sprayed material is likewise dealt with. The details have not always been made clear in some literature on the introduction of this subject. The smoke contents of gas were apparently originally first precipitated by electric point discharge by Hohlfeld in Germany, and Guitard in France, later applied to the fume from lead furnaces by Sir Oliver Lodge, but without success, and ultimately put into operation by Cottrell.

The latter discovered that it was not the mere presence of high tension electricity which exerted the desired effect on suspended particles, but the need for shock, according to certain rules of electric discharge. Suspended threads of cotton and asbestos, when charged with high-tension electricity caused the solid contents to be precipitated on the smooth inner surfaces of tubes surrounding them, but Möller substituted smooth thin wires with much greater success.

Widely Used System

This system, under different ramifications, is in use in various lead, zinc, silver, and other refineries throughout the world. Some of these filters comprise a system of tubes or chambers containing smooth discharge wires, extending along their entire length, and which, while the tube is earthed, are charged with high-tension direct current. The so-called corona, or brush discharge, is formed around the wire, which, on high-tension transmission lines, constitutes an undesirable source of loss.

With the filter, however, by constantly sending ionized particles of gas into the stream of gas within the tube, the corona performs useful work. The particles suspended in the gas are struck by the ions and charged with the same polarity as the wire, and are hence attracted to the wall of the tube, which is of the opposite polarity, and in turn give off their charge of electricity, thereby settling or flowing down to dust collectors, leaving the gas free of particles. The so-called "electric wind" is another phenomena which assists this process, and which can be made distinctly visible by ciné film applications.

For handling metallurgical waste gases in large quantity, a number of tubes are combined into a bundle, and the bundles formed into groups, to facilitate operations. The equipment includes a switchboard, high-tension transformer, high-tension rectifier, and synchronous motor.[6]

An alternative type of construction, although functioning on similar lines, substitutes plates of sieves as the precipitating electrodes, under the category of the box type.

In one lead smeltery, from 4 to 5 tons of fume are daily recovered by this system, while in a lead, zinc, and silver refinery, from 2 to 3 tons are obtained daily. The temperature, and moisture content, if any, exert no influence on the success of the process. Power consumption, however, varies widely because of the size and numbers of the particles, and the degree of purity demanded, and hence the ranges are within somewhat wide limits. As a rule the power fluctuates between 0.0043 and 0.056 kW. per cu. ft.[7]

As the matter of danger arises in view of the high-tension current employed, different measures are adopted to ensure that accidents are unlikely to materialize. In one arrangement, the cubicle within which this filtration proceeds cannot be entered unless two keys, belonging to different operatives, are available. In another, the current is linked-up so that so long as the high-tension current persists, the keys will be unable to function in the door locks.[8]

REFERENCES

1. Theisen G.m.b.H., Munich.
2. Zschocke-Werke A.G., Kaiserslautern.
3. Beth and Co., Luebeck.
4. Rheinmetal Borsig A.G., Berlin-Tegel.
5. C. B. Schneible Co., Chicago, Ill., U.S.A.
6. Lurgi Apparatebau G.m.b.H., Frankfurt/Main.
7. Siemens-Schuckertwerke A.G., Berlin.
8. U.S. Metals Refining Co., Carteret, N.J., U.S.A.

MINING MISCELLANY

Spain produced 16,400,000 tons of coal in 1957, an increase of 11 per cent over the production of the previous year.

*

It has been reported that uranium of high quality has been discovered in the Swiss Alps, notably in the Bregaglia Valley. The importance of the discovery is as yet not substantiated.

*

Average daily coal production was 80,840 tons in Hungary during February.

*

Iron and steel production capacity at the Karabuk mills in Turkey will have been increased to 700,000 tonnes in 1959, ten times the production of 1950.

*

Turkish copper production rose to 26,000 tonnes in 1957, privately owned chrome ore mines produced 600,000 tonnes during the same period, and State-owned mines 313,000 tonnes. Iron ore production at private mines yielded close to 500,000 tonnes last year, State producing 460,000 tonnes. Sulphur production totalled 15,000 tonnes.

*

It is reported from the Soviet Union that the Krasnoyarsk Territory is one of the richest iron ore depositories in the U.S.S.R., with ore deposits stated to amount to many "thousands of millions of tons". The development of some of these deposits has already begun. A mine has been opened and a dressing plant built in Khakassia. Other developments are planned.

*

Jachymov metal mines, Czechoslovakia, claim a world record by driving 3,350 ft. in thirty-one days in a cross measures drift of 97 sq. ft. cross-section.

*

Production records were set up last year in five of Australia's mining industries—coal, lead, zinc, iron, and steel. Lead production amounted to 330,000 tons and that of zinc to 295,000 tons. Pig iron output went up by nearly 200,000 tons to 2,217,706 tons, and steel output by about half a million tons to 3,055,024 tons. Aluminium ingot output at the Tasmanian Bell Bay plant was 10,624 tons, or about 1,500 tons more than in the preceding year.

*

A report from Thorshavn, in the Faroe Islands, states that United States companies are interested in finding new coal mines on the island and that applications to prospect for coal may be expected shortly.

*

The revised programme for the main dam wall of the Kariba project was approved by the Federal Power Board of Southern Rhodesia on April 8. The scheme is designed to ensure that the first generator will be commissioned early in 1960 despite this year's heavy floods.

*

A novel ore-crushing process that depends on the weight of the ore being treated to crush itself has been developed in Finland.

*

The Instituto de Fomento Industrial, Colombia, is reported as willing to contribute Ps.4,000,000 to modernizing the San Francisco and Tumba Gold Mines to the south of Cali.

At Climax Molybdenum, overflow-type ball mills are being converted to low-discharge pebble mills in the final stage of regrinding molybdenite concentrate from rougher flotation. Experience has shown that higher recoveries are obtained from pebble-ground material than from material reground with steel balls, whilst grinding cost is lower for equal size reduction.

PERSONAL

Messrs. A. T. Rogers and R. F. Jennings have been appointed technical directors of Huntington, Heberlein and Co. Ltd.

*

Mr. L. H. J. Phillips has been appointed assistant commercial manager, electronics department, and Mr. A. G. Barton, sales manager of the same department of Metropolitan-Vickers Electrical Co. Ltd.

*

Mr. S. E. Clotworthy, managing director of Northern Aluminium Co. Ltd., has been elected president of the Aluminium Development Association for 1958-59.

*

Mr. R. Massey Williams, mining engineer and geologist, has returned to private practice as a consultant. His new office is at Suite 408, 100 Adelaide Street West, Toronto 1.

*

We regret to announce the death of Mr. J. H. Pawley, a director of George Cohen Sons and Co. Ltd.

*

We regret to report the death of Mr. F. V. Sparks, export sales director of Robert Hudson Ltd.

*

The Council of the Institute of Metals has made the following awards of medals for 1958: the Institute of Metals medal in platinum to Professor-Emeritus Robert Salmon Hutton, M.A., D.Sc., and the Rosenhain medal to Dr. John Herbert Hollomon.

*

The following members have been elected officers to fill vacancies on the Council of the Institute of Metals: president, Marshal of the Royal Air Force Lord Tedder; vice-presidents, Mr. G. L. Bailey, C.B.E., M.Sc. (director, British Non-Ferrous Metals Research Association); Mr. R. D. Hamer, B.Sc. (vice-president and director, Aluminium Laboratories Ltd.); and Sir Ronald Prain, O.B.E. (chairman, Rhodesian Selection Trust Ltd., Roan Antelope Copper Mines Ltd., and Mufulira Copper Mines Ltd.); members of council, the Hon. Geoffrey Cunliffe (deputy-chairman and managing director, the British Aluminium Co. Ltd.), Dr. L. B. Hunt, MSc., A.R.C.S. (manager, Industrial Division, Johnson, Matthey and Co. Ltd.), Lord Kirkwood of Bearsden (director, Imperial Smelting Corporation Ltd.), Mr. W. F. Randall, B.Sc., A.R.S.M. (managing director, Metals Group, Telephone Construction and Maintenance Co. Ltd.), and Mr. F. W. Tomlinson, M.A. (managing director, Pyrotenax Ltd.).

*

E. H. Jones (Machine Tools) Ltd. have completed their new premises at Edgware.

Mr. Granville Horsley has been appointed to the board of Crofts Engineers (Holdings) Ltd. He has also been appointed joint managing director of the operating company, Crofts (Engineers) Ltd.

*

Mr. J. M. L. Howell, sales manager (earthmoving) of Distington Engineering Co. Ltd., has been additionally appointed sales manager (mining).

COMPANY EVENTS

The Sir George Earle Trophy for a notable achievement in the cause of industrial accident prevention has this year been awarded to Imperial Chemical Industries Ltd.

*

The establishment of a new works for the manufacture of a wide variety of conveyor chains is announced by Precision Chains Ltd.

*

As from April 22, 1958, the offices of H. H. Fraser and Associates (Rhod.) (Pvt.) Ltd. will be on the sixth floor of Magnet House, Main Street, Bulawayo.

CONFERENCES AND EXHIBITIONS

A symposium on hydraulic stope filling is to be held at the Montana School of Mines on May 9-10, 1958.

*

The exhibition "Wiggin in Your World" organized by Henry Wiggin and Co. Ltd. is being held in Hereford this week.

CONTRACTS AND TENDERS

The International Co-operation Administration has announced the following future procurements:

South Africa

12,000 lb. copper wire. Specified. Closing date, May 14, 1958. Ref. ESB/10184/58. Telephone inquiries to Chancery 4411, extension 738 or 771.

Australia

Coal-handling plant. Supply, delivery, erection, setting to work, testing and painting of complete belt conveyor type coal-handling plant. Full inclusions of equipments listed. Bids to the Commercial Manager and Secretary, the Electricity Commission of New South Wales, Box 5257, G.P.O. Sydney, New South Wales. Closing date, May 26, 1958. Ref. ESB/9437/58. Telephone inquiries to Chancery 4411, extension 738 or 771.

*

The U.S. Department of the Interior has signed a long-term contract with the Colorado Interstate Gas Co. giving the U.S. Bureau of Mines exclusive rights to extract helium from natural gas produced by the company in the Keyes Field, Cimarron County, Oklahoma. Although the Bureau does not now have a plant for processing the Keyes gas, the contract stipulates that if and when such a plant is built in the Keyes Field, the U.S. Government will have sole rights to process gas produced by the company in the field for its helium content. After removal of the helium, the gas would be returned to the company for regular commercial distribution.

Machinery and Equipment

Cage-raising Becomes Established

The necessity for increased hoisting capacity plus ventilation requirements at Mindola Mine prompted the Rhokana Corporation to sink another shaft very close to Mindola No. 1 shaft. This provided the opportunity to put into operation in a big way the cage-raising system so successfully utilized at Mindola.

With access from the main shaft available every 250 ft., it was decided to mine through from level to level an 8 ft. dia. pilot raise which would ultimately be sliped out to the required full size of 24 ft. In November, 1956, after preparatory work was begun, the first of many cage-raises was started on the 1,380 level. This raise was to be carried a matter of 253 ft. to the 1,127 level.

The first lift of 253 ft. was mined on a double shift and was completed in five weeks. Raising by this method continued on No. 2 shaft until 2,400 ft. of pilot raise had been completed at an average speed of 250 ft. per month, working three shifts. In addition to No. 2 shaft, 500 ft. of ventilation raise was put through—using the cage-raising system.

March, 1957, marked the commencement of cage-raising at Central shaft, where it was used to mine a ventilation raise for the ore-pass system. The complete ore-pass, waste-pass, and ventilation development at the sub-vertical shaft are at present being mined by cage-raising. In addition to these three raises, one at Central shaft, one at Mindola, and the third at S.O.B. are being mined simultaneously by the same method. The sub-vertical raises are 10 ft. in dia., and are for the ore and waste-pass system. They are being mined from cages 8 ft. in dia. in 330 ft. lifts from main level to main level.

Since the commencement of cage-raising some 6,000 ft. of vertical cage-raising have been completed at Central, South Orebody, and Mindola shafts.

Diagrammatic sketch showing how ground blasted from a cage-raise is cleared away from the bottom of the raise

ATLAS COPCO'S PROGRESS IN 1957

The Annual Review for 1957 of Atlas Copco emphasizes that technical research and development work progressed at an undiminished rate and progress is reported in a number of spheres.

The screw compressors that were referred to in the report of the previous year appear to be meeting expectations, and the design of a new stationary piston-type compressor has been completed. This new machine, with a considerable reduction in weight, has reduced installation cost and has made possible cheaper ancillary machinery. It has been built to replace earlier types of the 30 cu. m. range.

As regards portable compressors, the task of introducing a new design is well under way and already a large number of these welded machines with a capacity of 4 cu. m. have been delivered.

In the rock-drill field during 1957, a new medium-size machine was introduced. A new dual-purpose drill for shaft-sinking and stoping has been designed for the South African market.

The first deliveries of track-mounted loading machines were made during the year, and currently a new medium track-bound loader is being manufactured. A large capacity autoloader mounted on rubber tyres and designed for special conditions is now in production.

Serious attention has been devoted to the problem of modernizing rotary grinding machines to improve the design and increase efficiency. As a result, a rotary file operated with tungsten carbide cutters has been designed. This equipment is now in production.

THE ELECTRICAL WATCHDOG

The St. Louis Mines Equipment Co., together with the Westinghouse Co. in the United States, have developed a highly efficient "electrical watchdog" which snuffs out short-circuit sparks in coal-mine power systems, eliminating in this way disastrous mine explosions. The equipment has obvious applications also in metalliferous mines.

The device consists of a system of electric circuit breakers and relays housed in an explosion-proof jacket. It instantly cuts off power when danger of short circuit is detected or a machinery fault develops. Already tested and approved by the U.S. Bureau of Mines, the units stand less than 2 ft. high and range in length from 2 to 6 ft., depending upon the model.

An electric powerline system enters the gaseous section of a mine. The lines will be enclosed in cables which are connected by special couplings. Near the face of operations, the lines will pass through the watchdog, which is officially known as the "safety circuit centre". Each circuit centre has outlets for lines to individual mining machinery, such as cutters, loaders and drills.

Should any electrical failure at one of these machines occur, or should cable or machine insulation break down to a dangerous extent, the change in the amount of current flowing through the watchdog automatically shuts off the power.

With the watchdog in action, the only place any spark can occur is inside the explosion-tested safety centre itself or inside one of the special couplings. In either place a spark is harmless.

An unusually heavy flow of current through the circuit centre in either direction will automatically shut off the power.

Should a drill cable suddenly be damaged, the overload of current flowing through the watchdog to the drill will trip a switch that breaks the circuit.

If insulation at the machine should be damaged, there is a tendency for elec-

tricity to arc from the point of damage to the ground. To limit such an arc, the conventional safety ground wire provides a harmless escape path for the current. This wire carries the escaping current back to the watchdog, where it opens a circuit breaker, thus again cutting off the electric power to the machine.

The unit is built of aluminium and steel. Depending upon the size of the model, it varies in weight from 250 to 700 lb., and is mounted on skids so that it can be pulled from one location to another.

A NEW COALHAULER

A 335 h.p. trailer-type bottom dump coalhauler has just been announced by International Harvester Export Co., United States. The new 56-ton Model 95 Coalhauler has completed a year of actual field testing by coal-stripping operators throughout the United States, and several field modifications have been incorporated into the production model. According to drivers who have operated this new hauler during the experimental stage, it has five outstanding features: operating comfort, easy steering with a practical turning radius, good braking on tractor and trailer, good cab vision, and fast trailer dumping mechanism.

Powered by a Cummins NR TO-6BI diesel engine which delivers 335 h.p. at 2,100 r.p.m., the unit has ample power to handle the 56-ton payload. The unit can be equipped with either a nine-speed manual-type transmission or a four-speed automatic transmission. Empty weight of the complete unit is 66,940 lb. and gross weight with payload is 178,940 lb.

The bottom dump trailer is of International design, incorporating air-operated doors. Capacity of the trailer is 70 cu. yds. struck, 79 cu. yds. heaped, based on a 3-in-1 slope. It is constructed of $\frac{3}{16}$ in. high-strength steel sideplates reinforced with channel sections.

Bottom dump doors are of $\frac{1}{4}$ in. high-strength steel plate. Eleven three-piece steel hinges with $\frac{1}{8}$ in. dia. hinge pins are used for door mounting. Overall length of the tractor and trailer is 51 ft. 10$\frac{1}{2}$ in., overall width is 12 ft. 1 in. Clearance under the front axle is 12 in., drive axle 15 in., and 16$\frac{1}{2}$ in. under the trailer axle. Tread at front axle is 86 in.. drive axle 92$\frac{1}{4}$ in., and 99$\frac{1}{4}$ in. at the trailer axle. The unit is equipped with a 125 gal. fuel tank.

PEAK PRESSURE RELIEF VALVE

Excessive hydraulic pressures are frequently the cause of damage to pipes, connections, and perhaps front axles in tractors and earth-moving equipment. To prevent dangerous flick pressures arising in their B 250 tractor when fitted with a front-end loader, while traversing rough ground with a loaded bucket, the International Harvester Co. of Great Britain Ltd. called for a relief and isolating valve to be built into the circuit.

For this precautionary requirement the Hymatic Engineering Co. Ltd. have designed and developed their unit SV 33/3, and large quantities have been produced for Rubery Owen, who manufacture this loader.

This valve is designed for dividing oil flow from a single inlet connection to pressurize the two bucket rams. A balanced isolator valve (capable of being operated when pressurized) is provided on the inlet side of the valve for shutting off flow either to or from the rams.

A relief valve, to prevent excessive pressure build-up in the ram circuit, is incorporated between the two outlet connections. Any oil passing the relief valve is piped away to the tractor low-pressure reservoir. Designed for a flow of 4.5 g.p.m. S.A.E. 20 oil, the relief-valve setting is 2,400 p.s.i.

Above : The electrical watchdog equipment, developed by the Mines Equipment Co., United States, and the Westinghouse Electric Corporation

Below : The International Harvester Model 95 bottom dump coalhauler has a capacity of 56 tons

APPLICATION OF SIDE DUMP BUCKET

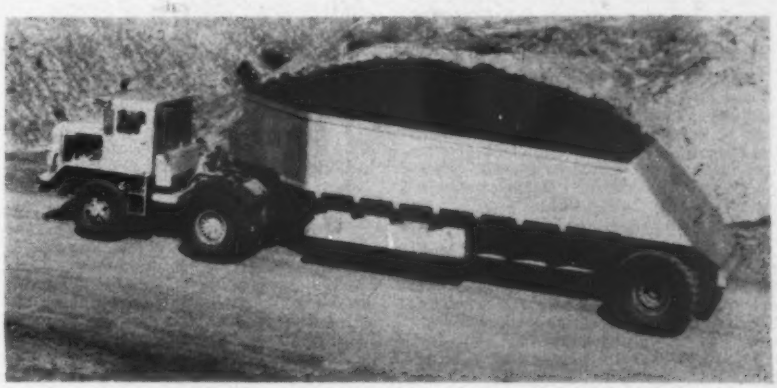
The side dump bucket hitherto used on the Catepillar No. 955 and 933 Traxcavators, has now been made available for this manufacturer's largest model Traxcavator, the No. 977. In announcing the availability of the new 2$\frac{1}{2}$ cu. yd. capacity side dump attachment, Caterpillar Tractor Co. noted that job reports have shown the tool especially useful for stockpile loading, backfilling, excavation of broken or loose material, and loading in confined areas.

The benefits of in-line loading are now afforded to the No. 977, including the ability to load without the continual turning demanded of standard tractor-shovels. The reduction in turning leads to higher production through lower cycle time, and lower maintenance due to decreased wear on track parts. The reduction of ground scuffing is also provided.

A "PREFAB" OFFICE BLOCK

A "Middlesex" prefabricated timber building was recently supplied and erected for the National Coal Board at Grigglestone coke oven and by-product plant by J. E. Lesser and Sons Ltd.

Completely prefabricated in 4 ft. sections, the building measures 80 ft. long by 24 ft. wide by 8 ft. to eaves, with a corrugated asbestos roof on 4 in. by 2 in. purlins.



Technical Briefs

Radiometric Determination of Uranium in Ores

The rapid determination of uranium in ores by radiometric means has been investigated by the United States Bureau of Mines in *Report of Investigations* 5390. Among the various procedures and schemes tested, two showed most promise. They were the ratio scheme developed in the Bureau's Tucson laboratory, and the equilibrium method developed by the Canadian Department of Mines and Technical Surveys.

The ratio method is a simple, empirical procedure for classifying the state of equilibrium in ores by measuring their radioactivity by means of a Geiger-Muller counter under three different conditions, using filters. The principal merit of the method is in providing a clue as to the reliability of equivalent uranium determinations.

In essence, the equilibrium method depends upon simultaneous measurement of the beta and gamma raditions given off by an ore. The apparent equivalent uranium content of the sample then is determined by comparing its beta activity with that of known assayed pitchblende standards in radioactive equilibrium. In a similar manner, the apparent equivalent uranium content of the sample also is determined from the gamma activity. The true uranium content of the ore is calculated by formula from these two equivalent values.

Neither the ratio method nor the equilibrium procedure is a substitute for quantitative chemical analysis, but either is useful as a control for screening out samples not worthy of chemical analysis. No single physical method has yet been devised that is universally applicable to give reliable radiometric determinations on the wide variety of ores encountered in uranium prospecting.

ASPHALT-BEARING ROCKS—POTENTIAL SOURCES OF URANIUM

Significant amounts of uranium have been found in the ash of oil extracted from asphalt-bearing rocks in Western States, according to a report published by the United States Geological Survey. The report is the result of an examination and appraisal of asphalt-bearing rocks in forty-five areas in California, Utah, Wyoming, Montana, New Mexico, Texas, Oklahoma, and Missouri made by the Geological Survey on behalf of the Division of Raw Materials of the United States Atomic Energy Commission.

A total of 202 samples from these areas was analysed for their uranium content. The significant amounts of uranium in the ash of oil extracted from the rocks were found in seven of the forty-five areas tested. These areas are: Chalone Creek, McKittrick, Edna, and Los Alamos areas, Calif.; Vernal area, Utah; Sulphur area, Okla.; and Ellis area, Mo.

The average uranium content of samples from these seven areas ranges from 0.028 to 0.376 per cent in the ash of the extracted oil. All except the Chalone Creek area contain large estimated reserves of asphalt-bearing rock, ranging ffom 15,000,000 to almost two billion tons.

It is believed that most of the asphalt deposits are oil residues, and that the uranium was introduced during or after the late stages of oil movement and loss of the lighter oil fractions. The report, titled *Reconnaissance for Uranium in Asphalt-bearing Rocks in the Western United States*, has been published as Bulletin 1046-E of the Geological Survey. Copies can be purchased from the Superintendent of Documents, United States Government Printing Office, Washington 25, D.C.

VELOCITIES AND PIPE-FRICTION LOSSES

The Hydraulic Institute in the United States is making a study of velocities required and pipe friction losses handling fluid-solid moistures and replies to a questionnaire sent to eighty operators, engineering firms, educational institutions and pump manufacturers are now being evaluated. The results will certainly be of great value, as efficiencies are often very low with centrifugal pumps of this kind and replacement of wearing parts heavy. Work on the use of plunger pumps has been undertaken in South Africa, and it is well known to many operators that the old wheel-type elevator compares more than favourably for small lifts, and the Frenier or spiral pump is used in Sweden in preference to the conventional centrifugal pump in some operations.

APPLICATIONS OF POLYMERIC ACIDS

It is reported that at Rammelsberg, in the Hartz district of Germany, polymeric acids have improved clarification and filtering.

Separan is said to have proved satisfactory when used in conjunction with thickeners in the flotation circuit, but gelatin has shown better action with the thickened tailing. Barite concentrate with 95 per cent-325 mesh is filtered after adding Tween 8, which is emulsified in petroleum, whilst pyrite concentrate containing fine aegillaceous slate is thickened with aid of DT 120 (Farbwerke Hoechst A.G.) and then filtered with an addition of Tween petroleum emulsion. The action of the latter would appear to be due to the powerful flocculating action of fatty acid/petroleum oil emulsions on minerals on which the fatty acid is adsorbed.

AGGLOMERATING TECHNIQUES

A series of articles based on papers before the A.I.M.E. appeared in the March issue of *Mining Engineering*. Two distinct techniques are being used, i.e. the travelling grate and the shaft furnace after suitable balling in drums or "saucers".

Normal sintering is used on material ranging from ¼ in. to about 100 mesh, but when the concentrate is composed of a flotation product, for example, it may be quite impervious to a gas stream and therefore not suitable for conventional sintering. The tendency for such material to aggregate is used in such cases, but some specular hematites exhibit poor aggregating properties, and binders such as bentonite and/or the return of fine sintered material is necessary to obtain a permeable bed and a favourable sinter.

Down-draught grates and the combined up-draught and down-draught used in the German Lurgi process are described in which the heating is entirely supplied by liquid. In this case the drying is done by down-draught with hot air from the burning zone, which is also down-draught. The final cooling, on the other hand, is accomplished by using up-draught, the hot air, having withdrawn the heat from the charge, being used to feed the burners and the pre-drying as required.

The shaft furnace is also described, which for very fine material offers advantages in fuel economy and lower capital cost. The preparation of the balls is important, as they must be sufficiently cohesive and strong to be fed to the furnace. A special balling drum has been developed at Erie, as it is essential that the balls form slowly so that they have a high density and that no fines enter the furnace.

TREATING LOW-GRADE COPPER ORE

The 3,000 ton per day concentrator at the Pima Mining Co. property, Arizona, started operation late in 1956. The ore is low grade, and during 1957 averaged 1.78 per cent Cu (of which 0.12 per cent is oxide) and is treated by conventional flotation, using Rougher Scavanger cleaner and re-cleaner circuits, whilst all cleaner tailing is reground before returning to join the feed of the primary grinding circuit. The Scavanger concentrate is reground along with the cleaner tailing and Fagergren cells are used throughout.

The crushing and grinding section follows what is now becoming general practice, namely: three-stage crushing to 1 in., which is followed by one rod mill in open circuits delivering to cyclones and two ball mills in closed circuit.

REGULATING VISCOSITY

In France, a typical tannin, known as Drex, has been prepared from chestnut trees and results are said to be better than quebracho when used to regulate viscosity and thixotropy in drilling sludges. With Montmorillonite, the effect of using the chestnut extract was to lower the viscosity at all stages tested, although the effect was more pronounced when the addition was between 0.5 and 4 g.p.l. In the presence of calcium sulphate, the results were also better.

The action of the tannin appears to be one of satisfying the free valencies of the clay due to Si or oxygen, which prevents the particles from reuniting and so lowers the viscosity and the thixotropy. As tannin products are also used both as deflocculants and dispersants in mineral dressing, the new product may be of value.

Metals and Minerals

World Bauxite Production Rises

Comparative figures of bauxite production in the years 1956 and 1957, issued by the Bureau of Mines, U.S. Department of the Interior, show a further increase in the world output of this mineral. Last year's production is estimated at 18,300,000 l.tons, which compares with 17,400,000 l.tons in 1956.

Jamaica increased its production by 48 per cent to become the world's leading producer for the first time with an output of 4,643,220 l.tons (3,141,330 in 1956). The Reynolds subsidiary is now producing bauxite at the rate of 2,000,000 tons per year, while Kaiser is expanding its rate of operations to 4,000,000 tons per year. Jamaican production is therefore expected to exceed 6,000,000 tons a year.

Alumina exports from Jamaica amounted last year to 435,746 l.tons, being thus more than double the 1956 total of 207,333 tons. By mid-1957 the production capacity of the Kirkvine factory of Alumina Jamaica Ltd. had been raised to 490,000 tons per year, while the same company's new alumina factory at Ewarton—scheduled for completion in 1959—will have a capacity of 190,000 tons per year. The two factories will be capable of treating nearly 2,000,000 tons of crude bauxite per year.

Surinam, the second largest source of bauxite, maintained production last year at approximately the same level as in 1956, the comparative figures being 3,452,400 tons and 3,427,539 tons. In British Guiana production fell in 1957 to 2,106,800 tons from 2,480,983 tons in 1956.

Haiti became a producer for the first time in April, 1957, when Reynolds Haitian Mines started shipping ore from Miragoane to the United States, a total of 318,345 l.tons being shipped from this island during the year.

The importance of the Caribbean area is underlined by the fact that last year countries in this region accounted for 57 per cent of world production. It is also noteworthy that 11,989,954 l.tons—nearly two-thirds of the total world output—was produced in American countries.

The United States ranks as the fourth largest producer of bauxite. Preliminary figures show that output in 1957 was 1,414,189 l.tons, a decrease of 19 per cent from the previous year's production. Despite this decline, shipments of domestic ore from mines to processing plants and consumers increased by about 10 per cent.

In France, the third largest producer, output fell last year to 800,400 l.tons from 1,442,655 tons in 1956. This reduction was partially offset by an increase in the production of French West Africa from 444,371 to 550,800 l.tons. In the U.S.S.R. production is estimated to have risen from 1,083,000 to 1,191,000 l.tons, while a substantial improvement is also recorded for Greece—from 688,947 to 857,400 tons. In all other producing countries output was little changed.

The estimated total U.S. consumption of foreign and domestic bauxite in 1957 was 7,600,000 l.tons, being slightly lower than in the previous year. Of this amount 6,972,000 tons, or 92 per cent, was consumed in the production of alumina.

The outstanding question for bauxite producers is, of course, the ability of the world market to absorb the substantially larger supplies of bauxite and alumina which may be anticipated during the coming year, notably from Jamaica. Prospects are, of course, largely dependent on the extent and duration of the present recession in the United States. The consensus of authoritative opinion appears to favour an upturn in the late summer, but economists are by no means unanimous in their views.

It is at any rate encouraging that Alcoa has been able to report a small increase in orders in every recent month, with March the best period since last October. The company's chairman and president both stress that when the anticipated upturn does materialize, it will come "like a snowball". They base this view partly on the belief that customers have worked down their basic aluminium inventories and will soon be demanding more metal.

The chairman, Mr. I. W. Wilson, expressed confidence that any future changes in the price of aluminium would be upward rather than downward. By implication, this prediction presumably holds good for bauxite prices, which remained unchanged last year in the U.S. except for imported abrasive and refractory ores which advanced by 95 c. and $1.20 per l.ton respectively.

Moreover, once business starts improving again, aluminium is expected to advance particularly rapidly because of its increased uses in motor cars, building, transportation, and the electrical industry.

DULL PLATINUM MARKETS

No improvement in platinum demand has materialized in the New York market and the over-all price situation has further weakened. Leading refiners are still offering rates for new business from $72 per troy oz. in bulk up to $75 in lesser quantities, but dealers on the outside market are able to offer platinum in fair amounts as low as $67 an oz. In fact, quotations now range from $66 to $67. The availability of Russian metal continues to overhang the market.

In London, dull conditions still characterize the free platinum market and prices are drifting lower through lack of interest. The metal is now indicated at £22 10s. to £23 10s. per troy oz. compared with £23-£24 previously. Even at this reduced level, the buying end of the range has been described as largely nominal. It is reported that substantial parcels of platinum have recently become available on the Continent at cheap prices, though, generally speaking, these lots are not being taken up. In view of the weak state of the market and with adequate supplies available, potential buyers are in no hurry. Meanwhile, the two leading refiners of platinum in the United Kingdom continue to maintain their quotation to regular customers of £26 15s. per troy oz.

QUICKSILVER PRICES

Domestic quicksilver is now quoted in the United States at $231-$235 per flask, against $233-$237 previously. It remains to be seen to what extent this reduction will have the effect of diverting further supplies of Mexican metal to London, where spot metal is now available at about £76 10s. per flask compared with £77 previously. As pointed out in our issue of April 4, $235 a flask in New York, excluding the import duty of nearly $20, is equivalent to an origin price of almost $77 per flask for Mexican quicksilver.

The supply position in London is reported to have loosened as the result of greatly improved imports during March, which at 2,874 flasks were substantially above the average monthly rate of 1,513 flasks for the whole of last year. Not all the March imports have been sold.

*

In the first two months of 1958, Italy exported 46.6 tonnes of quicksilver, compared with 373.5 tonnes in the corresponding period of 1957.

U.S. MANGANESE ORE

Urging that the United States Government should protect its investment in 300,000 tons of low-grade manganese ore stockpiled in the Butte-Philipsburg areas, Senator Mike Mansfield declares that the Government will be throwing away $9,000,000 unles it moves fast to process this ore, which will rapidly become useless if left untreated. O.D.M. has stated that it lacks the authority to continue manganese buying or to authorize upgrading of the ore at Butte.

*

The Turkish Ministry of Economic Affairs has announced that by the end of April exports of low-grade chrome and manganese ore will be stopped. Present shipments comprise contracts concluded before banning of export sales of these two ores on a barter basis against mining machinery and equipment.

*

India is considering a proposal for the bulk sale of manganese ore to the United States in return for imports of wheat.

AUSTRIAN MAGNESITE PRODUCTION

Austrian production of raw magnesite increased last year to 1,172,600 tonnes from 1,083,000 tonnes in 1956. It is reported that a further increase in output can be expected. In the first two months of this year some 209,000 tonnes of magnesite were produced against only 165,800 tonnes in the corresponding period of 1957. Over 90 per cent of Austrian magnesite is exported.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

In the copper market the strike at Chuquicamata has been the main topic of interest and when it was reported earlier this week that talks had been resumed, the price in London developed a weaker undertone. The other interesting piece of news which has had a direct influence on the market was the announcement towards the end of last week that Kennecott had made a further reduction in their production in America. It would appear that this company has now reduced its rate of production to 67 per cent of that ruling in 1957, which was approximately 387,000 s.tons.

News from America continues to be disappointing and members of the brass trade in particular remain very pessimistic, although even they are beginning to think that there will not be a further sharp recession in the price. The main talking point has been the report that the Chilean Government have proposed to the U.N. Commission on International Commodity Trade that consideration should be given to the formation of a scheme to prevent the "violent fluctuations in copper prices on the world market".

It has also become known that there is to be a meeting in London on May 8 between copper producers and consumers, but it is not clear who will be participating in this, although it is known that a Chilean representative will be present. Opinion on the Metal Exchange is still that if the major producers and consumers would make more use of the facilities offered by the market, fluctuations would be less violent and fewer complaints could be levelled against the prices themselves.

On the Continent of Europe, demand remains good with both cathodes and wirebars commanding good premiums, and at the end of the week the Belgian producer raised the price to the equivalent of approximately 22½ c. per lb.

TIN'S "MOMENT OF TRUTH"

The undertone in the tin market has remained uncertain in spite of a reduction in the official stocks at the beginning of the week by 467 tons and the announcement from the buffer stock manager that contributions have now been received to the Special Fund, which was announced after the last meeting of the Tin Council. It is thought that the most critical stage of the buffer stock's existence is now at hand, and it is to be hoped that sufficient money has now been made available to see the thing through. The next meeting of the Council is on April 29 and it is expected that there will be no change in either the price ranges or the export quotas, in spite of agitation from some participants.

In the United States the consumption of tin in January showed a rise of some 18 per cent to totalling 6,320 l.tons, and a substantial decrease in stocks by 1,800 tons, but there are still no signs of buying on any considerable scale. In 1957 the tonnage of tin used in the tinplate industry dropped by 8 per cent in spite of the production of tinplate itself reaching a new peak. This is largely due to the continual decline in the tonnage produced by the hot dipped process as opposed to the newer electrolytic methods. On Thursday morning the Eastern price was equivalent to £737½ per ton c.i.f. Europe.

U.S. TARIFF COMMISSION SPLIT

The lead and zinc markets remain very quiet with continuous rumours that the Tariff Commission in America is about to make its recommendations. As we go to press, it is reported that the Commission has split 3 to 3. The final decision is thus left to the President who must make up his mind within 60 days whether to accept the quota recommendations, meet the problem by a single tariff increase or do neither. There have also been reports that the administration is toying with yet another alternative. This is a subsidy programme for domestic producers who, of course, have in effect already been subsidized in recent years by the government purchases for the stockpile. In spite of an increase in consumption of lead in the United States in January, stocks in producers' hands showed a further increase to 88,500 tons, and it is apparent that cutbacks in this metal has not yet had any effect. In zinc the domestic production in the U.S. in February was 15 per cent below that of January and in this case it appears that the cuts are at last becoming noticeable. In Europe the situation in both metals remains almost in balance and if it is true that new barter transactions are being negotiated, the position can easily become tighter.

The British Bureau of Non-Ferrous Metals Statistics have published their figures for February and the most interesting are now given. Consumption of copper amounted to 51,559 l.tons, being a decrease of about 5,000 tons from January, whilst stocks rose by almost 7,000 tons to 89,147. In lead the off-take decreased by about 2,000 tons to 27,855 but owing to a high rate of export, stock figures also decreased from 49,134 to 47,738. In zinc the off-take was down by about 3,000 tons to 24,551, whilst stocks rose by about the same amount to 46,662. In tin the usage fell by almost 200 tons to 1,567 and stocks rose by almost 2,000 tons to 20,322, which gives some indication of the additional tin which passed into the hands of the buffer pool during the month.

Closing prices and turnovers are:

	Apl. 17		Apl. 24	
	Buyers	*Sellers*	*Buyers*	*Sellers*
COPPER				
Cash	£174½	£174¾	£173¾	£173½
Three months	£176½	£176½	£175½	£175¾
Settlement	£174½		£173½	
Week's turnover	7,275 tons		8,225 tons	
LEAD				
Current ½ month	£73	£73⅛	£73	£73¼
Three months	£73	£73⅛	£73¼	£73⅜
Week's turnover	2,225 tons		2,375 tons	
TIN				
Cash	£730	£730½	£730	£730½
Three months	£729½	£730	£730	£730½
Settlement	£730½		£730½	
Week's turnover	1,020 tons		705 tons	
ZINC				
Current ½ month	£62⅜	£63	£62½	£62½
Three months	£62⅞	£63	£62⅝	£62⅝
Week's turnover	3,800 tons		3,200 tons	

LONDON METAL AND ORE PRICES, APRIL 24, 1958

METAL PRICES

Aluminium, 99.5%, £180 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £190 per ton
Crude (70%) £190 per ton
Ore (60%) basis 19s. 6d./20s. 6d. nom per unit, c.i.f.

Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 10s. 0d. lb.
Cerium (99% net), £16 0s. lb. delivered U.K.
Chromium, Cr. 99% 7s. 2d. lb.
Cobalt, 16s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 8d. per gram
Gold, 249s. 5d.
Iridium, £26 oz. nom.
Lanthanum (98/99%) 15s. per gram.
Manganese Metal (96% - 98%) £310
Magnesium, 2s. 5½d. lb.
Nickel, 99.5% (home trade) £600 per ton
Osmium, £20/£22 oz.
Osmiridium, nom.
Palladium, £7 10s. oz.
Platinum U.K. and Empire Refined £26 10s. oz.
Imported £22½/£23½
Quicksilver, £77/£78 ex-warehouse nom.
Rhodium, £40/£42 oz.
Ruthenium. £15/£18 oz. nom.
Selenium, 50s. 0d. per lb.
Silver, 76d. f. oz. spot and 75½d. f'd.
Tellurium, 15s./16s. lb.

ORES AND OXIDES

Bismuth	30% 5s. 0d. lb. c.i.f. 20% 3s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semifriable) 48%	£17 5s. 0d. per ton c.i.f.
" Hard Lumpy 45%	£18 0s. 0d. per ton c.i.f.
" Refractory 40%	£12 5s. 0d. per ton c.i.f.
" Smalls 44%	£16 5s. 0d. per ton c.i.f.
Baluchistan 48%	£12 0s. 0d. per ton f.o.b.
Columbite, 65% combined oxides, high grade	nom.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF_2)	156s. 0d. ex works
Lithium Ore—	
Petalite min. 3½% Li_2O	47s. 6d /52s. 6d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O	£26 5s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£22 0s. d/d
Manganese Ore Indian—	
Europe (46% - 48%) basis 67s. 6d. freight	nom.
Manganese Ore (43% - 45%)	nom.
Manganese Ore (38% - 40%)	nom.
Molybdenite (85% basis)	8s. 5d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO_2 (prompt delivery)	£39/£40 per ton c.i.f. Aust'n
Ilmenite 52/54% TiO_2	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	84s. 0d./87s. 0d. per unit c.i.f.
Vanadium—	
Fused oxide 90 - 93% V_2O_5	£10 per unit c.i.f.
Zircon Sand (Australian) (65 - 66% ZrO_2)	£16 per ton c.i.f

Mining Finance

Randfontein And The Gold Price

In the pre-1949 period Randfontein was quite rightly regarded as likely to be one of the supreme beneficiaries among the Rand mines from a higher price for gold. Now, eight years later, there is still a tendency to think that the mine would be transformed once again should the dollar gold price be put up materially. It is questionable whether there is now such a great tonnage of low-grade ore that would be thereby brought into the pay limit. The chairman, Mr. D. A. B. Watson, is himself quite cautious on this point in his annual review issued in advance of the meeting. He says that a "certain proportion" of the present unpayable tonnage would become payable thereby prolonging operations for a "further period".

But it is his reference to the effect of a higher gold price on the revenue received for uranium, now the company's major profit source, that will arouse most interest. He points out that a gold price increase could actually lower the price obtained for uranium under the present government contract which runs until the end of 1964. This is because the uranium price is related to the cost of production and for Randfontein this means the actual cost of producing uranium less revenue from by-product gold in this section of the mine's operations. Obviously, in these circumstances, higher income from gold would lower the contract figure for costs and thus adversely affect the price.

Things might, of course, be very different after 1964 when the company will probably have to enter into a free market for its uranium and there is unlikely to be any tie-up between the price received and production costs. Then any increase in gold revenue, as Mr. Watson says, would have a greater beneficial effect on overall earnings than under present arrangements. Gold revenue could, in fact, then play an important part in determining how commercial Randfontein could be in the uranium market.

All this has little present significance because there are still no near-term signs of any alteration being made in the American price of gold. But it may well make the Kaffir market even more cautious than it has been for some time past about the long-term prospects for Randfontein £1 shares which stand at 25s. to yield 18 per cent on the 4s. 6d. paid for 1957. The company's tax liability will increase this year and in subsequent years. In the past quarter the mine's profit from gold and uranium after tax was equal to an annual rate of 4s. 2d. per share.

ST. HELENA'S TAX POSITION

No chairmen's statements accompany the annual reports of the South African gold mines in the Union Corporation group, which are thus mainly of interest for their bringing together of the statistical information which has already appeared in the 1957 quarterly reports and for the underground reef maps that accompany some of them. This year, too, each report contains a detached photograph showing some phase of the company's activities. Shareholders have, of course, already received more up-to-date information than is contained in the annuals via the March quarterly reports.

Of the meetings to be held in the second week of May, that of St. Helena on the 16th will probably be most eagerly looked to for fresh information of importance. This O.F.S. mine's new No. 2 shaft will be coming into commission this summer and will be opening up a new phase in the company's career. It will mean, for one thing, that the next stage in production expansion will come into view, namely: from the present 113,000 tons monthly to 150,000 tons. Perhaps of even more importance from the share market viewpoint, it will enable reef development to be started in the north-eastern part of the mine towards the common boundary with the rich northern area of President Brand. High reef values, already published, in an ore pass from St. Helena's new shaft and from a borehole near the Brand boundary have whetted speculative appetites concerning the possibilities of this north-eastern area.

St. Helena follows the example newly set by other O.F.S. companies in publishing the extent of its loss for tax purposes, a loss that arises out of the capital expenditure that ranks for redemption under the Union's enlightened fiscal arrangements before there is any liability by a new mine for either tax or the payment of profits to the Government under its mining lease. The St. Helena figure at December 31 was £5,918,000. In relation to the mine's current profit rate of some £2,100,000 per annum, this means that it would be 1961 before any serious tax liability began to be incurred. Profits are, of course, likely to be considerably stepped up before then, thus absorbing the tax offset more quickly. On the other hand, there will be further capital expenditure to rank for amortization.

The report of Van Dyk Consolidated is of main interest for the light that it throws on the capital return possibilities for this mine, which is now in the final stages of its disappointing career. Net liquid assets at December 31 were £618,358, equal to 2s. 3d. per share, the nominal value of which has already been reduced to 9s. by the return of 1s. a share. It was announced last month that a fresh capital repayment of 1s. 3d. is now proposed. This would leave 1s. still available on top of which the policy of picking the remaining eyes out of the mine is resulting in earnings equal to 1s. per share per annum.

How long this can be maintained is difficult to estimate, but the impression is growing that Van Dyk at 4s. 6d. (with the further capital return of 1s. 3d. included in the price) are a very reasonable proposition in what is generally referred to as the "break-up" class of Kaffir. There is, in other words, a good chance of the eventual tax-free distributions giving a useful profit to the shareholder who is prepared to take, say, a three-year view.

GOVERNMENT AREAS

Shareholders in Government Areas will probably be pleased with Mr. Watson's information that 1958 profits from pyrite production should be at a rate of approximately £250,000 to £300,000 after repayment of, and interest on, the requisite loans, especially as there is an accompanying implication that earnings from this source should increase rather than diminish as production from current mining slimes falls away and is replaced by slimes from the mine's old dumps. These old residues are, it is stated, likely to be more than sufficient to cover the Government contract period, which ends in September, 1964.

Gold operations at Government Areas are virtually at an end, but Mr. Watson does not hold out any great hope that the consequent realization of assets will produce funds of any great importance. Meanwhile, the company is making capital returns. The first, of 6d., is being paid next week. A second, also of 6d., is now proposed. Government Areas 4s. 6d. shares have, in fact, become a highly specialized holding. There can be no final "break-up", at least until after 1964, but over the period there seems a good chance that the present market price of 3s. 9d. will be returned and more.

Mr. Watson is again unable to hold out much hope for Freddies Consolidated, the struggling O.F.S. gold and uranium producer. For East Champ d'Or, he can only reiterate last year's warning that uranium resources are unlikely to be sufficient to fulfil the official contract, which runs until the end of 1964. Although 1958 profits should be maintained, overall there may, he says, be some slight falling off towards the end of the period.

R.B.H. SELLS LOCALLY

The preliminary profit and dividend announcement for 1957 of Rhodesia Broken Hill was detailed here on March 21 last. Of principal interest in the full report is consequently Mr. H. F. Oppenheimer's review which contains a number of points of importance affecting the future of this lead-zinc producer. First of all he reveals that most of the lead output (15,000 tons last year) is now sold in Southern Africa and, although some of the zinc has to be sent overseas, this metal is also expected to find a ready market close at hand in the not too distant future. This is an encouraging development, although it does not, of course, protect the company from the falling metal values, prices obtained being related to the London Metal Exchange quotations.

A further point of encouragement is that Mr. Oppenheimer confidently expects zinc production (which reached a record of 29,500 tons in 1957 and should be around this mark in the current year)

to find a ready market in 1958 while the demand for lead will exceed the company's output. This makes good reading in the present state of base-metal markets. But the lead picture is, in fact, not quite so rosy as this. Output will be reduced by 20 per cent to about 12,000 tons this year. And the reason is that the company has had to abandon for the time being the use of its lead-blast furnace owing to continued sintering troubles. These, in conjunction with the lower metal price, have so reduced the profit margin that it has been decided "with some reluctance" to revert to use of the old Newnam hearth plant in order to achieve lower costs. Meanwhile, research on the improvement of sintering methods continues.

Capital expenditure of R.B.H. during 1958 is estimated at £400,000 of which half will be provided from a £400,000 loan that has been obtained at 5¼ per cent from the Broken Hill Municipality to help finance the Lunsemfwa (Mita Hills Dam) scheme, a hydroelectric project designed to be of mutual benefit to both the mine and the township. Repayment will certainly not be a burden to R.B.H. It is in annual instalments over 30 years starting in 1962; Capital expenditure on the R.B.H. mine itself looks likely to be reasonably modest following completion of the heavy media separation plant which is now in operation while it is stated that of the £450,000 appropriated towards capital needs from the 1957 profits, some £50,000 is for 1958 capital expenditure.

This is an important point in relation to the dividend outlook for the current year when R.B.H.'s profits must be expected to decline further unless there is a very material upswing in metal prices during the remainder of the period. The 5s. units stand at 7s. 6d. to yield, without allowing for double tax relief, 12.2 per cent on the dividend of 11d. net of Rhodesian tax paid for 1957. R.B.H. could be quickly responsive to any decided turn for the better in lead and zinc prices.

INCO CUTS AGAIN

As we go to press comes the news of a further 10 per cent cut by International Nickel in its nickel output. A little more than a month ago, Inco announced that owing to the world surplus, production would be cut by 10 per cent. It was then stated that unless business in Canada and the United States quickly improved, a further curtailment would be required. Hence the second reduction comes as no surprise. Effective from the beginning of May, it will reduce the company's output of nickel to about 125,000 s.tons a year. Even after the latest curtailment, the rate of production will exceed the current flow of incoming orders. Stocks will therefore continue to accumulate. Those held by Inco and by the United States Government now exceed 52,500 s.tons, not including the United States stockpile or inventories in the hands of consumers.

It is further reported that the General Services Administration Agency of the United States Government has re-negotiated contracts with Inco and other suppliers of nickel, under which the Government will take less metal than had been originally contracted for. G.S.A., which has been under pressure from Congress, has complained for some time that it has been paying too high a price for nickel. Suppliers reluctantly agreed to cancel part of their deliveries and postpone the rest. In 1953, G.S.A. entered into a five-year contract to take 150,000 s.tons from Inco. Part of this contract has now been cancelled with Inco's consent, but the greater part has been re-scheduled for delivery after October, 1958, and before the end of 1959.

Inco's output of copper, platinum and other metals will also be reduced as a result of the new cut, although not necessarily by 10 per cent. Last year the company produced 125,000 l.tons of refined copper and 339,000 oz. of platinum metals.

LONDON MARKET HIGHLIGHTS

Business almost completely dried up in mining share markets on the Stock Exchange last week. So much uncertainty appeared to surround the immediate economic outlook for base-metal producers that share dealers found themselves forced into an impasse: few were willing to hold much stock on their books and at the same time it was felt to be unwise to be short of shares. The attitude of investors was simply one of when in doubt do nowt, and while jobbers stood around in one of the quietest periods on record, any investing that took place was done with the building society.

Even gold shares, which had been behaving so encouragingly in recent weeks, started to fall back, although—as with base metals—there was very little selling. The drying up of buying interest in Kaffirs was said to be largely a result of the increased Nationalist majority in the South African General Election, but since nobody had really expected any United Party successes, this explanation seemed to be rather tenuous.

The balance of the quarterly reports made their appearance, but the few disappointing pieces of news contained in them received more attention than the bright spots. The 1,533 in. dwt. in President Brand's development summary, for instance, merely left the shares a few pence easier. Buffels, too, were unaffected by good development news. At Virginia, on the other hand, the decline in both gold and uranium values continued last quarter and this caused genuine disappointment in the market. The shares consequently fell 7½d. to 7s. 7½d. Another dull spot was in Welkom, which last quarter encountered a sill in the south-western part of the mine. The news was considered as being particularly discouraging, as it is in this area where happier underground news is looked for. Welkom at first eased only slightly, but later, when a bear position was unravelled, the shares came back to 12s. 4½d.

There was a brighter tendency in non-South African Golds. Globe and Phoenix provided a highlight on the increase in this year's first interim of 1s. to 2s. 6d. The shares, which were already giving a yield of over 19 per cent on last year's total 5s. dividend, soon rose from 25s. 6d. to 27s. 9d. Also firm were Ashanti—recommended here in recent weeks—which responded to a steady investment demand and rose to 14s. 9d. Kwahu emerged from the background to gain a useful 6d. to 2s. 9d. on the plan for restoring the company to the dividend list.

Base metals moved uncertainly in very quiet trading conditions for most of the time, but towards the end of the week the setback on Wall Street left most prices here looking easier. In Coppers, Chartered suddenly weakened 2s. to 57s. 9d. as stock came in from both local and continental sources. Messina issues held fairly steady in front of the still awaited interim dividend announcement. The maintained "Tanks" interim was gratefully accepted (the shares rose 1s. 9d. to 51s. 9d.) despite the accompanying qualification that this should not be taken as an indication that the final payment would also be maintained.

Curiously enough, Tin shares occasionally edged forward a few pence on some local inquiry despite the general paucity of business in this market and the uncertain course of the metal prices. Ipoh (14s.), Siamese (8s.), and Sungei Besi (13s. 6d.) were all 6d. higher. Beralt, however, eased to 25s. on the fresh fall in the wolfram price.

Elsewhere in a not very inspiring week the Consolidated Murchison quarterly did little to penetrate the pervading gloom. Admittedly, there was a profit for shareholders to compare against the previous quarter's loss, but there was also the disclosure that falling demand had necessitated a cutback in production. The shares were thus allowed to fall 2s. 6d. to 25s.

RUSTENBURG INQUIRY

A Commission has been appointed to inquire into the curtailment of mining operations by Rustenburg Platinum. It will attempt to determine "whether reasons for the cut in operations are adequate and whether the extent of the cut and the resultant retrenchment in employees is justified". It is also to decide whether there is any danger of further curtailment and retrenchment and whether steps can be taken to remove or minimize such danger.

U.S. URANIUM PROCUREMENT

The U.S. Atomic Energy Commission recently announced that it would expand its domestic uranium procurement plans to a limited extent. The new policy relaxes an A.E.C. order issued in October, 1957, that halted contracts involving construction of uranium mills. This action will result in new procurement contracts for mill concentrate that will add about 3,000 tons to the estimated 20,400-ton daily capacity of twenty-three privately owned uranium mills currently operating or under construction.

A total of 11,755 mining claims were recorded in Saskatchewan during 1957, approximately 70 per cent in the La Ronge and Churchill mining divisions. Promising copper-zinc discoveries were made in the Brabant Lake, Bleasdell Lake and Waden Bay areas, and extensive diamond drilling is being carried out. Claim staking has been heavy. The value of the province's mineral production in 1957 soared to a new high of approximately $158,000,000.

GOVERNMENT GOLD MINING AREAS (MODDERFONTEIN) CONSOLIDATED LIMITED

(Incorporated in the Union of South Africa)

Statement to members by the Chairman, **Mr. D. A. B. Watson,** on the Directors' Report and Accounts for the Year ended December 31, 1957. (Issued to Members prior to the Forty-eighth Annual General Meeting, to be held in the Board Room, Consolidated Building, corner of Fox and Harrison Streets, Johannesburg, on Friday, May 2, 1958, at 2.15 p.m.).

Operations—Gold Mine :

Losses were incurred during the first few months of 1957, and when it became apparent that operations could no longer be profitably continued at the then milling rate of approximately 150,000 tons, this was reduced to 60,000 tons during the month of June, 1957, and thereafter. On present evidence it appears that this is about the minimum economic milling rate.

As a result of these reductions, further retrenchments of personnel were effected during the year. At December 31, 1956, 1,338 Europeans and 7,598 Natives were in the service of the company, while at December 31, 1957, 561 Europeans and 3,748 Natives remained.

The reduced rate of milling resulted in an increase in the working costs per ton milled and, consequently, in the exclusion from reserves of a certain tonnage of ore which previously was payable, the total tonnage available for extraction being thereby diminished. In order to cover this increase in cost, selective mining was carried out with the result that the recovery value per ton milled increased from 2.6 pennyweights in 1956 to 3.2 pennyweights in 1957. Working costs at the present time are of the order of 43s. 6d., and the yield is approximately 3.5 pennyweights per ton milled.

Operations on the mine are continuing on the basis of attempting to extract, in due course, as much of the remaining tonnage of payable ore as may be possible and of salvaging underground equipment while so doing. Virtually no development is being carried out and the mine should under existing circumstances be regarded as having ceased normal operations. It is not possible to state how long mining can continue, having regard to the present slender margin of profit.

Together with the production of gold from ore currently mined and the salvage of underground equipment, sand and slime residues from old dumps are being profitably retreated in the reduction works. It is difficult to allocate expenditure accurately against the various activities at present carried out, particularly in regard to overhead and administration charges and charges for hoisting, ventilation, pumping and the operation of the gold recovery plant. The revenue derived from all these activities, and the expenditure incurred thereon, are therefore being treated as being part and parcel of the same operation.

Production—Pyrite :

The pyrite plant is operating satisfactorily. Profits are somewhat greater than was anticipated, owing largely to the fact that, with the diminution in the rate of production of current slimes, a greater proportion of slimes from the old dumps is now being treated, the cost of treating this material being lower than that of treating current residues. Present indications are that during 1958 profits should be maintained at a rate of approximately £250,000 to £300,000 per annum, after providing for the repayment of, and interest on, loans raised for the pyrite plant.

An amount of £44,866 was spent during 1957 on increasing the facilities for the disposal of slimes after treatment in the pyrite extraction plant. It is not expected that any capital expenditure will be incurred this year.

Notwithstanding the reduced tonnage of current slimes which is available for treatment, the tonnage of old residues available is likely to be more than sufficient to cover the period of the present contract for the supply of pyrite. This ends in September, 1964.

Funds :

The results for 1957 are set out in the Directors' Report. No dividends were paid during the year, but a return of capital amounting to 6d. per share is to be made to members registered on March 31, 1958, and to holders of Share Warrants to Bearer. At a meeting to be held after the Annual General Meeting on May 2, 1958, the return of a further 6d. per share will be recommended.

Sales of assets are proceeding as and when opportunity arises. The amount received from these sales will be relatively small compared with the Balance Sheet value of the assets, plant and buildings. This figure reflects the cost of these items and bears little relation to the net amounts likely to be received when they are sold. The company owns no freehold, and, for as long as pyrite production continues, some of the houses,

THE EAST CHAMP D'OR GOLD MINING COMPANY LIMITED

(Incorporated in the Union of South Africa)

Statement to Members by the Chairman, **Mr. D. A. B. Watson,** on the Directors' Report and Accounts for the year ended December 31, 1957 (issued to Members prior to the Fortieth Annual General Meeting, to be held in the Board Room, Consolidated Building, corner of Fox and Harrison Streets, Johannesburg, on Thursday, May 1, 1958, at 2.15 p.m.):

Accounts :

Working Profit for the year, before providing for interest on, and repayment of, uranium loans, was £89,737 (1956, £95,331). After taking into account interest on, and repayment of, uranium loans, sundry items of revenue and expenditure, adjustments to the general and capital reserves and after allowing for the payment in dividends of an amount of £60,637, the undistributed balance at December 31, 1957, was £18,962.

Operations :

Operations were confined to the Bird Reefs and were stabilized at the rate of approximately 12,000 tons milled per month. The ore reserve tonnage was slightly increased, but as no major areas remain for future development, it can be expected that ore reserves will now decrease. The company will very probably be unable to continue operations for the full period of its uranium contract, which terminates in December, 1964.

It is anticipated that the present milling rate will be continued at least during 1958 and 1959, but it is becoming increasingly difficult to maintain the grade of ore available for milling. Although it is likely that overall profits earned during 1958 will be of the same order as those earned last year, there may be some slight falling off towards the end of the current year.

There are at the present no assets available for disposal, as all are required for the conduct of the present operations. When the company's assets are finally realized the only funds accruing will be those arising from the sale of buildings, plant, equipment and machinery, as this company owns no freehold ground. The value of the mining assets is shown in the Balance Sheet at the figure of £544,681, while the value of the uranium project is shown as £126,492. As stated in the notes accompanying the accounts, no allowance is made for the depreciation of these assets and their probable value on disposal is well below that shown in the Balance Sheet and is likely to be relatively small in relation to the share capital of the company.

SUMMARY OF RESULTS

	1957	1956
PRODUCTION		
Uranium Division		
Tons milled	143,000	154,200
Uranium oxide produced—lbs.	116,853	130,066
Recovery per ton—lb.—uranium oxide	.817	.843
Gold produced—ounces fine	4,176	5,139
Recovery per ton—dwt.—gold	.584	.667
ORE RESERVES at December 31		
Bird Reef Series		
Tons	167,000	161,000
Stope value—dwt.—gold	1.0	0.9
Stope value—lbs.—uranium oxide	1.1	1.0
FINANCE		
Working Profit, before providing for interest on and repayment of uranium loans	£89,737	†£95,331
† The profit for the year ended December 31, 1956, excludes extraordinary non-recurring revenue of £43,558		
Taxation	£26,060	£36,388
Dividends :		
Total	£60,637	£86,624
Per share	7d.	10d.
Unappropriated Profit carried forward	£18,962	£20,172

offices, workshops and other facilities at the mine will be required for that purpose. It can be expected, therefore, that the major source of the funds which will become available for future distributions to members will be the profits arising from the production of pyrite during the period of the current contract.

SUMMARY OF RESULTS

	1957	1956
PRODUCTION		
Pyrites		
Slimes treated—tons	1,730,600	1,825,100
Pyrite concentrates produced—tons	152,163	155,287
Gold		
Tons milled	1,077,000	2,765,000
Gold recovered from current milling—ounces fine	174,350	353,341
Recovery per ton—dwts.	3.238	2.556
Gold recovered from old residues—ounces fine	15,848	4,895
Gold recovered from clean-up of portion of Reduction Works—ounces fine	2,455	—
ORE RESERVES at December 31		
Tons	662,000	1,112,000
Stope value—dwts.	5.7	4.9
FINANCE		
Working Profit, after providing for interest on and repayment of pyrite loans	£216,605	*£234,620
* The Profit for 1956 included £37,521 non-recurring additional pyrite revenue arising from retrospective price adjustments.		
Capital Expenditure	£23,429	£11,024
Taxation and Government Share of Profits	£33,486	£30,204
Funds at December 31	£408,407	£68,131

THE RANDFONTEIN ESTATES GOLD MINING COMPANY, WITWATERSRAND, LIMITED

(Incorporated in the Union of South Africa)

Statement to Members by the Chairman, **Mr. D. A. B. Watson,** on the Directors' Report and Accounts for the year ended December 31, 1957 (issued to Members prior to the Sixty-fifth Annual General Meeting to be held in the Board Room, Consolidated Building, corner of Fox and Harrison Streets, Johannesburg, on Thursday, May 1, 1958, at 11 a.m.):

Accounts :

Working profit for the year, after providing for interest on, and repayment of, uranium loans, was £1,258,819 (1956, £1,212,504). After taking into account sundry items of revenue and expenditure and allowing for transfers to uranium and general reserves and for capital expenditure, and for the payment in dividends of an amount of £914,300 (1956, £1,015,888), the undistributed balance at December 31, 1957, was £43,877 (December 31, 1956, £28,354).

Taxation :

The company's tax position is referred to in the Directors' Report. Whereas no tax liability arose in respect of mining revenue during the years 1953 to 1956 inclusive, during the year 1957 the liability in respect of such revenue amounted to £326,406. As has been pointed out, the percentage of tax in relation to profits will, during the current year and in subsequent years, be greater than was the case in 1957.

Operations—Gold Division :

The tonnage milled and the profits earned in the Gold Division declined during the year, and, depending to some extent upon the Native labour position, may decline further during the current year. The major portion of the ore reserves is now situated in the North-East shaft area and work in the rest of the mine other than on the Bird Reef Series is currently confined virtually to the reclamation of certain remaining blocks of ore and the salvage of material.

Operations—Uranium Division :

During the year the company produced 833 short tons of uranium oxide and it remains the largest single producer in the country.

Development of the Bird Reef Series was for the most part concentrated in the Northern section of the mine where the uranium values are higher than those so far encountered in the Southern section. An abnormally high proportion of the total footage was accomplished in tunnels in country rock, which tunnels are required to gain access to areas subsequently to be developed on reef. The development programme is proceeding according to plan and towards the end of 1957 additional stope faces were becoming available. The rate of stoping increased slightly during the first quarter of the current year and it is expected that by the end of 1958 the rate of milling will have been increased by a further 5 to 10 per cent and that the treatment plant will at that stage be employed to its full capacity. The increase in profits earned in the Uranium Division should at least compensate for any decrease in the profits earned in the Gold Division during the current year.

Future Operations—Gold Division :

In the event of an increase in the price of gold at some future date, a certain proportion of the tonnage of gold ore which is now unpayable would become payable and operations in the Gold Division would thereby be prolonged for a further period and some additional profit would no doubt arise from this.

Future Operations—Uranium Division :

An increase in the price of gold would also have some impact on the profitability of operations in the Uranium Division. The extent of this impact depends upon whether the event occurred during the period of the present contract or thereafter. Prices receivable under the present contract are related to the cost of production and in the case of this company the cost of production is deemed to be the actual cost less the revenue received from the production of by-product gold in the Uranium Division. An increase in such revenue results to a significant degree in a reduction in the price receivable for uranium.

In the event that the price offered for uranium after the expiry of the present contract is *not* related to the cost of production, revenue received for by-product gold would be all for the account of the company and any increase in such revenue would have a greater beneficial effect on profits than would be the case under present arrangements.

The quantity of gold contained in the ore mined for uranium and the price receivable for such gold will be factors of some importance in determining the potential profitability of uranium opera-

SUMMARY OF RESULTS

	1957	1956
PRODUCTION		
Gold Division		
Tons milled	714,000	1,085,000
Gold produced—ounces fine	117,787	170,461
Recovery per ton—dwts.	3.299	3.142
Uranium Division		
Tons milled	1,631,000	1,703,000
Uranium oxide produced—lbs.	1,666,001	1,508,806
Recovery per ton—lbs.—uranium oxide	1.021	.886
Gold produced—ounces fine	116,290	94,146
Recovery per ton—dwts.—gold	1.426	1.106
ORE RESERVES at December 31		
Gold Division		
Tons	537,000	992,000
Stope value—dwts.—gold	4.5	3.8
Uranium Division		
Tons	1,550,000	1,710,000
Stope value—lbs.—uranium oxide	1.2	1.2
FINANCE		
Working Profit, after providing for interest on and repayment of uranium loans	£1,258,819	£1,212,504
Taxation	£326,406	£16,400
Capital Expenditure :		
Uranium Project	*£4,118 *(*Recoupment*)	£44,665
Other capital expenditure	£24,041	£165,182
Dividends :		
Total	£914,300	£1,015,888
Per Share	4s. 6d.	5s.
Unappropriated Profit carried forward	£43,877	£28,354

tions after the termination of the existing contracts.

Varying opinions have been expressed and widely divergent estimates put forward with regard to the possible requirements of world markets for uranium after the termination of the various contracts entered into by South African producers of uranium. These contracts expire in general during the period 1963 to 1966, this company's contract terminating on December 31, 1964.

Meanwhile, all that can be said is that in respect of this company's future, development of the mine continues to bear out the previously expressed opinion that a considerable tonnage of ore from the Bird Reefs will remain unmined at the end of the contract period. The fraction of this tonnage which will be payable at that time will be dependent upon the then working costs per ton mined and treated, the extent of the revenue received for gold recoverable as a by-product of uranium production and upon the price which can be obtained for the uranium oxide produced. These various factors cannot as yet be assessed with sufficient accuracy to enable any worthwhile estimate to be made as to the probabilities or the extent of the profitable continuance of uranium production by this company after December, 1964.

FREDDIES CONSOLIDATED MINES, LIMITED

(Incorporated in the Union of South Africa)

Statement to members by the Chairman, **Mr. D. A. B. Watson,** on the Directors' Report and Accounts for the Year ended December 31, 1957. (Issued to Members prior to the Fourth Annual General Meeting to be held in the Board Room, Consolidated Building, corner of Fox and Harrison Streets, Johannesburg, on Friday, May 2, 1958, at 11 a.m.)

Accounts:

The profit for the year on the combined operations for the recovery of gold and uranium amounted to £114,345 (1956, Loss £192,258), being comprised of a working loss on gold mining operations of £236,355 (1956, £449,117), and a net profit from uranium, after providing for amortization and interest payments, of £350,700 (1956, £250,892). Total capital expenditure amounted to £67,338 (1956, £158,971). The net additions to funds, after providing for capital expenditure, interest on loans, sundry revenue, interest received and various other minor items amounted to £56,164 (1956, net outgoings £404,329).

Financial Position:

At December 31, 1957, the net funds in hand amounted to £462,964, in addition to which the company held marketable assets in the form of 68,500 shares in Free State Geduld Mines Limited. Since the date of the Directors' Report, March 4, 1958, 5,500 of these shares have been sold for a total sum of £22,544.

The first repayment in respect of the amount of £1M owing to the National Finance Corporation becomes due in October, 1958, and the amount due for repayment during the current year is £450,000.

Operations:

The most important aspect of operations during the year 1957 has been the gradual increase in the rate of stoping, which is, however, still well below that required to provide sufficient ore to satisfy the capacity of the reduction plant. Physical conditions underground remain difficult and the achievement of the required objective of building up ore reserves and increasing the present rate of production is still likely to be a slow and arduous process.

The addition to ore reserves during 1957 amounted to some 100,000 tons. While an increase in the rate of development would naturally expedite the building up of ore reserves, the company is not financially in a position to meet the cost of this additional work. It appears desirable to continue with the present policy of attempting gradually to increase production and the earning capacity of the company without encroaching upon its present cash resources.

The area of higher values in the North 2 shaft section was, as was forecast last year, found to be of limited extent. The average value of all development sampled throughout the mine during 1957 was 328 inch-dwts.

The rate of sorting increased from 14.5 per cent. during the year 1956 to 26.7 per cent. during 1957 and to just over 30 per cent. during the first quarter of 1958. As a result of the increase in sorting the average yield per ton milled increased during the year by 0.83 dwt., as compared with the previous year, the remainder of the increase, namely 0.73 dwt., being accounted for by the higher grade of ore sent to the mill. The policy of close sorting will be continued in order to reduce the volume of slimes residue to be treated for its uranium content.

Uranium revenue received during the year was of great importance, the net profit of £350,700 being sufficient to offset the loss of £236,355 arising from gold, with a resultant small profit on the combined operations of gold and uranium production.

Future Operations:

During the first quarter of 1958 operations have been adversely affected by the seasonal shortage of labour and the rate of stoping and development has been well below the average for last year and below the targets set for this year. The labour force is now increasing and it is hoped that the shortfall which has arisen during the earlier months of the year can be overtaken in the near future.

The values obtained in the development sampled during the year 1957 indicated that the value of the ore to be stoped during 1958 should be of the order of 320 inch-dwts., as compared with the figure of approximately 350 inch-dwts. for 1957, during which period the higher grade ore situated in the North 2 Shaft was available.

During February and March of this year the overall value of the limited development footage sampled was significantly lower than that obtained last year. The current deterioration in development values is as yet of too short a duration to provide an indication of the average value of the development which will be sampled during 1958, but if it continues and if it leads to average results materially below those obtained in 1956 and 1957 some doubt will in due course arise as to the possibility of maintaining stoping values of the order of 320 inch-dwts.

Forward exploratory development is proceeding. Present indications are that there is little likelihood of any improvement in the difficult underground conditions which arise from the presence of khaki shale and the severity of the faulting throughout the areas so far explored, while the presence of water-bearing fissures remains a constant hazard. For these reasons it can be expected that the working costs on this mine will remain at a high level.

There is at present no evidence that the areas to be developed on reef during the current year will contain ore of an average grade higher than that normally encountered in the mine. In respect of working costs and grade, therefore, there appears little likelihood of any immediate improvement in the present situation. Hopes of consolidating the position of the mine still centre around the possibility of continuing to increase the scale of operations, these hopes being to some extent realized in 1957. Production during the early months of 1958 has been below last year's average, but it is hoped that the position will improve during the remainder of the year.

The results of operations are still vulnerable to the impact of small unfavourable movements in respect of costs and grade. Although results for 1957 were more encouraging, in that for the first time in the history of the company a small profit was earned, the situation is by no means secure and continues to cause anxiety.

SUMMARY OF RESULTS

	1957	1956
PRODUCTION		
Tons milled	665,000	719,000
Gold produced—ounces fine	192,165	151,547
Recovery per ton—dwts.—gold	5.779	4.215
Tonnage entitlement of this company under Joint Uranium Production Scheme	657,715	888,175
Uranium oxide—lbs. apportioned	208,217	217,572
Yield per ton on lbs. apportioned	.317	.245
ORE RESERVES at December 31		
Tons	1,292,000	1,193,000
Stope value—dwts.—gold	5.6	6.0
Stope value—lbs.—uranium oxide	0.34	0.38
FINANCE		
Working Profit, after providing for this company's share of the pumping, treatment and amortization charges in terms of the Joint Uranium Production Scheme (*1956—Loss*)	£114,345	(*Loss*) *£192,258*
Capital expenditure on Mining Installations	£67,338	£45,681
Interest paid on loans from National Finance Corporation of South Africa and Building Societies	£62,215	£62,344
Net additions to funds for the year (*1956—net outgoings*)	£56,164	*£404,329*

Publications Received

The section devoted to non-ferrous metals (smelting, rolling, etc.), Vol. 3, Industry G, of the *Report on the Census of Production* for 1954 was published on April 11, 1958, by H.M. Stationery Office.

★

As with the seven existing British Standards for cranes and excavators, the purpose of revised BS 357:1958 is to indicate minimum constructional requirements and to ensure reliability and safety in use. No restriction is placed by the standard on the general design of cranes or the methods employed on their construction.

★

The extensive developments that have taken place during recent years in diesel engine manufacture and the greatly increased use of diesel power in industry, have made necessary a thorough revision of BS 649. The new edition now published is narrower in scope than any predecessors and concentrates on the stationary diesels.

★

Ground water in Hidalgo County and most of Luna County, North Mexico, is suitable for domestic, livestock, irrigation, and many industrial uses, according to data shown on two preliminary maps released by the U.S. Department of the Interior. The maps were prepared by the United States Geological Survey in cooperation with the State Engineer of New Mexico. They show the locations of wells from which samples of ground water have been collected and the amounts of the principal dissolved chemical constituents in the water sampled. The samples were collected as part of the continuing programme of water-level observation in Luna and Hidalgo Counties, and in conjunction with groundwater studies in the Mimbres, Animas, and Playas valleys.

Copies of the maps are on file in the offices of the State Engineer of New Mexico at Santa Fe, Roswell, Albuquerque, and Deming; the County Agents at Deming and Lordsburg; the Soil Conservation Service, Deming and Lordsburg; the New Mexico Bureau of Mines and Mineral Resources, Socorro; as well as in the Geological Survey Library, Room 1033, General Services Administration Building, 18th and F Streets, NW., Washington, D.C.; also in offices of the Geological Survey, Room 468, New Custom House, Denver, Colo.; Room 602, Thomas Building, Dallas, Tex.; Room 504, Federal Building, Salt Lake City, Utah, and Room 279, Geology Building, University of New Mexico, Albuquerque.

★

State of the Union, Yearbook for South Africa, 1958, comprises 452 pages and carries on the tradition that ensured so warm a welcome for the first edition. In this edition for 1958, new chapters have been added, whilst others have been revised. The contents of the volume are therefore completely up to date.

★

Maxam Pneumatic Equipment for Production—50 Typical Circuits has been published by the Maxam Division of the Holman Group of Companies. It is well known that there has been a tremendous increase in the use of pneumatic control devices and equipment and a considerable broadening of the fields of application. But it is also recognized that this has come about only in the past few years and that there is still a very important educative function to be performed by manufacturers of this equipment and by all who have the cause of industrial efficiency and higher productivity at heart. This involves introducing the uninitiated to the potentialities of air control systems and also advising and assisting those who are relatively unfamiliar with the subject as to the best means of using pneumatic equipment to perform a specific function. This new Maxam publication is an excellent and ready means of reference, and will prove a real boon to all. It contains fifty full pages of circuit diagrams and for each there is an accompanying page describing the sequences of operations.

★

A special supplement giving details of progress made during the past five years is included in the January, 1958, issue of *Strata*, the quarterly magazine of Joy-Sullivan Ltd. In a message in the supplement, Mr. John C. George, C.B.E., M.P., chairman of the company, explains the reasons for the major reorganization scheme which began in 1952. A heavy backlog, and unhappy customer reaction, meant a complete overhaul. Now, five years later, Joy-Sullivan can look back with satisfaction on what has been achieved.

★

A geological chart showing the stratigraphic relationships and fossil zonation of a part of the Tertiary sequence in south-western Washington has been published by the Geological Survey, U.S. Department of the Interior.

The information shown on this chart was accumulated as a part of the Geological Survey's programme of mineral fuels investigations in the Centralia-Chehalis coal district, Washington, and later extended westward into the Doty-Minot Peak area. It will provide detailed stratigraphic control for petroleum exploration and more precise correlation and dating of coal-bearing strata in an area of widely separated outcrops, thick sequences of strata of uniform lithology, and numerous interlaminated volcanic flows.

The chart consists of two sheets: sheet 1 measures about 40 by 50 in.; sheet 2, about 38 by 39 in. Titled *Stratigraphy and foraminiferal zonation in some of the Tertiary rocks of southwestern Washington*, by Weldon W. Rau, this publication has been issued as OC 57 of the Oil and Gas Investigations chart series. Copies can be purchased at 75 c. per set from the Distribution Section, Geological Survey, Denver Federal Center, Denver, Colo., and from the Geological Survey, Washington 25, D.C.

★

The annual report of the chief inspector of mines in India for 1955 presents statistics relating only to mines governed by the Mines Act, 1952. The number of such mines which worked during the year was 3,027, consisting of 853 coal and 2,174 other mines.

★

Minerals Yearbook, 1954, published in three volumes, includes data collected in the United States for the 1954 census of the minerals industry. Volume I includes chapters on mineral commodities, both metals and non-metals, but exclusive of the mineral fuels. Included also are a chapter reviewing these mineral industries, a statistical summary, and chapters on mining technology, metallurgical technology and employment and injuries. Volume II includes chapters on each mineral-fuel commodity and includes chapters reviewing the industry as a whole complete with statistical summary. Volume III includes chapters covering each State of the U.S., as well as other territories.

★

Geophysical Investigations for Radioactivity in the Harts Range area, Northern Territory, has been published as Report 32 by the Bureau of Mineral Resources, Geology and Geophysics, Australian Department of National Development. In this report, details are given of an investigation of the Harts Range area, in connection with the search for radioactive minerals. The area is the most important producer of mica in Australia. Tests for radioactivity were made at about sixty mines; samples from several were crushed and tabled and the fractions assayed radiometrically in the Bureau's Melbourne laboratory. The radioactive occurrences found may be divided into two classes. The first comprising those occurrences where a definite radioactive mineral could be detected; the second in which the source of the activity could not be identified. The report comprises 22 pages and includes maps.

GOVERNMENT OF SIERRA LEONE

INSPECTORS OF MINES

QUALIFICATIONS: Diploma or degree in metalliferous mining of a recognized School of Mines or British University or a qualification or experience regarded as equivalent and at least two years' actual mining experience after qualification. Experience managing African labour or miners useful.

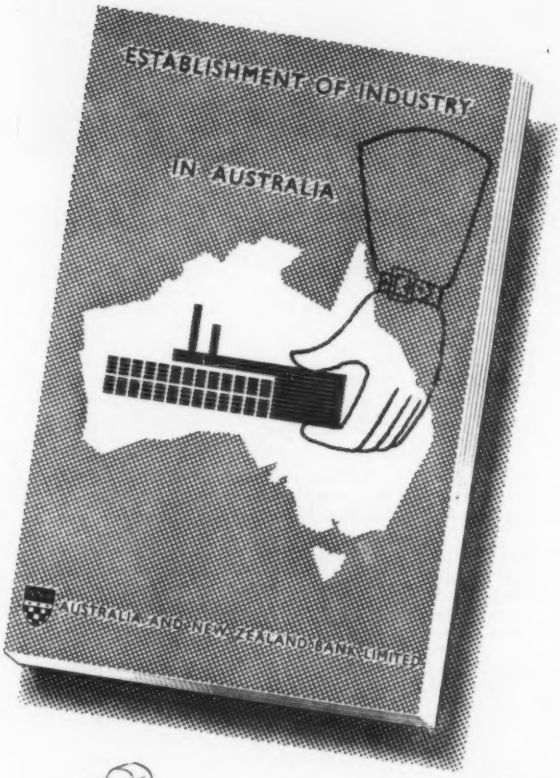
AGE LIMITS: Preferably 25-35.

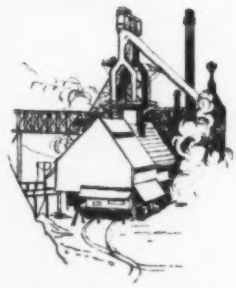
DUTIES: The officer appointed will be required, in the area under his control, to inspect mines and enforce the mining laws, especially in regard to safety; to supervise and control any native alluvial mining scheme in force there; to maintain pertinent official records and report to his immediate superior officer; to inspect machinery for safety; to examine candidates for blasting certificates. He will probably be stationed in the Protectorate at a district headquarters in charge of a branch office, or camped in the bush away from easy communication in rough and malarious country where he may be alone except for local inhabitants.

TERMS OF APPOINTMENT: On (1) permanent and pensionable terms, or (2) contract/gratuity terms for two tours, with emoluments in the scale (1) £1,176-£1,776 per annum, and (2) £1,300-£1,924 per annum with gratuity of 15 per cent of total emoluments on satisfactory completion of contract. (1) and (2) Outfit allowance. Free passages, officer and wife. Assisted passages and allowances, children. Quarters provided if available at rental. Free medical attention. Generous leave. Taxation at low local rates.

Apply to Director of Recruitment, Colonial Office, London, S.W.1. State age, qualifications and experience. Quote BCD 99/15/02/H1.

ESTABLISHING AN INDUSTRY IN AUSTRALIA?





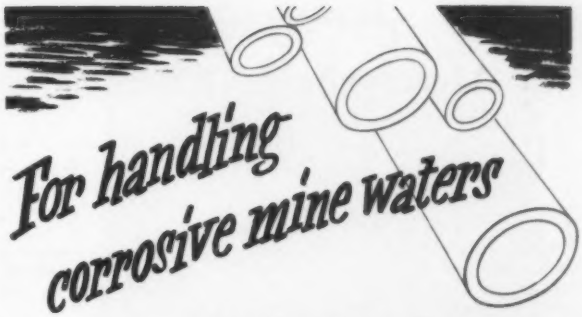
Then, the new 70 page book "Establishment of Industry in Australia" produced by Australia and New Zealand Bank will assist manufacturers contemplating the possibilities of extending their activities to that country.

Market potential, tariff protection, power supplies, transport, labour, taxation, company formation, local regulations and import licensing are a few of the many subjects dealt with in detail.

A copy will be gladly sent on request.

AUSTRALIA AND NEW ZEALAND BANK LIMITED

71 CORNHILL, LONDON, E.C.3. TELEPHONE AVENUE 1281



For handling corrosive mine waters

there's nothing to equal

MOSELEY HIGH IMPACT PVC PIPING

This piping is completely resistant to corrosion by acid or alkaline mine waters; it is tough and strong, withstanding the roughest handling. Pressures up to 600 psi, according to bore and temperature. It will give an indefinitely long life for pit-water drainage and pumping.

High Impact PVC Piping is much lighter in weight than metal piping, and needs the minimum of pipe supports.

Several effective methods of jointing are available, making the joint as strong as the pipe itself.

Moseley PVC Piping is also extremely valuable for conveying the chemical liquors used in ore extraction plants, giving long life free from all corrosive troubles.

Sizes from ¼ in. to 6 in. nominal bore, in light, medium and heavy gauges.

Write for this brochure on Moseley Polyvinyl Chloride Piping.

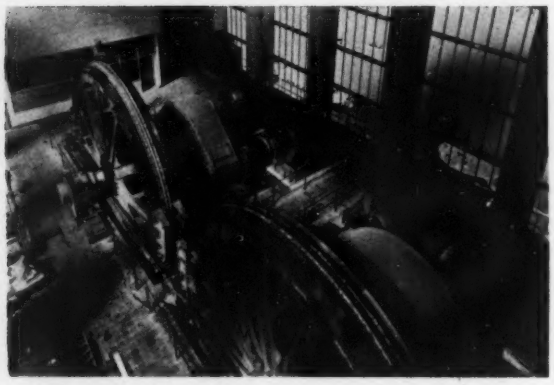
Enquirers should state the particular application they have in mind and give full details of working conditions.

RIGID PVC and POLYTHENE TUBES
HIGH DENSITY POLYTHENE TUBES and CHEMICAL HOSE

DAVID MOSELEY & SONS LTD.
ARDWICK · MANCHESTER 12
55 NEW BOND STREET, LONDON, W.1. and
54 GEORGE ROAD (ISLINGTON ROW) EDGBASTON · BIRMINGHAM

MPT 16

Metropolitan-Vickers in 1957



Friction winders at Rothes Colliery, each 1,890 h.p.

DURING 1957, Metropolitan-Vickers Electrical Co. Ltd. maintained its tradition of supplying an impressive amount of equipment for the mining industry, both in the U.K. and overseas.

A 3,000 h.p., 490 r.p.m., 11 kV. "AIF" winder (a.c.) drive for Manton Colliery and a 2,600 h.p., 493 r.p.m., 6.6 kV. "AIF" winder for the New Consolidated Goldfields at Doornfontein, South Africa. A 3,100 h.p., 720 v., 72 r.p.m. winder (d.c.) motor and its generator, a 2,300 kW., 720 v., 490 r.p.m. machine, were despatched to the Welkom Gold Mines of the Anglo American Corporation.

Other large a.c. motors completed are a 3,000-h.p. 490-r.p.m. 11-kV. "AIF" winder drive for Manton Colliery and a 2,600-h.p. 493-r.p.m., 6.6-kV. "AIF" winder drive for the New Consolidated Goldfields at Doornfontein.

There were numerous orders received during the year for d.c. motors and generators for winders and rolling mills, including the Bevercotes and Grimethorpe collieries of the N.C.B. The motors for Bevercotes are duplicate of those for Rufford and Warsop.

Winder motors are in hand for Peckfield, Silverhill, Ellistown, Parkside and Agecroft collieries of the N.C.B. where mercury arc rectifier/invertor winders are being installed. The motors for Parkside and Agecroft are each 2,500 h.p., 800 v., 530 r.p.m. and are designed to have a low inertia.

Orders for overseas include a 1,000 h.p., 600 v., 574 r.p.m. winder motor for the Great Boulder Gold Mines, Australia.

Electric Winders

Up to the present electrical drives for mine winders have been predominantly either d.c. Ward-Leonard or a.c. 3-phase (slipring motor). Last year, however, saw the recognition of the mercury arc rectifier/invertor system. The successful operation of the prototype of this new control at Monk Bretton colliery (National Coal Board) has resulted in eleven further orders for rectifier equipments, including four of 2,500 h.p. for four-rope friction tower-mounted drives at Parkside and Agecroft collieries which will permit automatic and manual operation. In each case the rectifier system was compared economically with the Ward-Leonard and a.c. systems, taking into account the capital cost, interest and running cost. A clear economic advantage was evident with the use of mercury arc rectifiers.

During the year, at Rothes colliery, two tower-mounted single-rope friction-drive winders were commissioned. These winders, rated at 3,780 h.p., are the largest friction-drive tower-mounted winders in the country. The control system is Ward-Leonard employing closed-loop control with metadyne amplifiers. At the Rufford colliery (N.C.B.) a winder was erected employing the four-rope friction-drive principle. The two direct-coupled motors are overhung and have hollow armatures, which are bolted directly to the drum shaft flanges by hydraulically pre-stressed bolts. This feature facilitates interchangeability and it is believed that it is the first time this technique has been employed on winders in the U.K.

During the year an a.c. manual closed-loop control system was developed, and a 1,350 h.p. a.c. winder was successfully commissioned at West Cannock No. 5 colliery (N.C.B.). The driver has speed control with overriding acceleration and retardation control with torque limitation. This is believed to be the only closed-loop manual a.c. winder in the country on which the driver need not manipulate the control lever to retard the winder.

Although the majority of new winder installations in the United Kingdom employ cylindrical drums or friction-drive pulleys, occasionally site conditions justify the more complicated bicylindro-conical drum construction. Such a case has arisen at N.C.B. Penrikyber colliery, South Wales. As a result of this, during the year an order was placed for a 2,030 h.p. a.c. winder with a bicylindro-conical drum.

Among orders for overseas was one from African Associated Mines (Pvt.) Ltd. for an automatic a.c. winder for the Shabani shaft, which will be of 1,200 h.p., with the same automatic a.c. control already in successful use in the auomatic a.c. winders installed in the Newcastle and Cumberland Division of N.C.B.

Colliery Electrification

Four 850 h.p., 6.6 kV. flameproof type KF squirrel-cage motors were supplied through Harland Engineering for driving main de-watering pumps for the new Cynheidre colliery, South Wales.

Orders received include a contract from N.C.B. for 90 h.p. flameproof motors specially developed to drive Armstrong air breakers. These are six-stage air compressors used as an alternative to explosives for breaking coal off the face; a number of advantages are claimed for this method, the reduction in the fire hazard being very important. Bulk ordering by N.C.B. Purchasing and Stores department is now following from successful experiments at various collieries. This is the first contract M-V has received from this new department.

For overseas, M-V have supplied though Davey, Paxman six 147 kVA. type RF synchronous generators, switchgear and automatic voltage regulators for diesel-electric equipment being supplied by Orenstein Koppel, of Germany, for Consolidated Diamond Mines, South Africa. An order for two further sets has followed. Other export orders include six 700 h.p. type RW slipring motors and control gear for ore crushing equipment at the Mount Isa lead mines, Queensland, Australia; from Victor Products Ltd. for 360 stator and rotor units for 150 c/s coal drilling units for Poland; and from Beckett and Anderson for ten 30 h.p. type RW slipring motors, switchgear and control gear for additional haulage drives for underground duty at the Singareni collieries at Hyderabad, India.

Among technical developments of the year was the addition of a direct-mounted MCU gate-end unit on the l.v. side of the standard certified 300 kVA. flameproof transformer. Of the large number of non-flameproof and flameproof units supplied for use below ground most have been of the mining Transwitch type with a circuit-breaker on the h.v. side.

Mining Locomotives

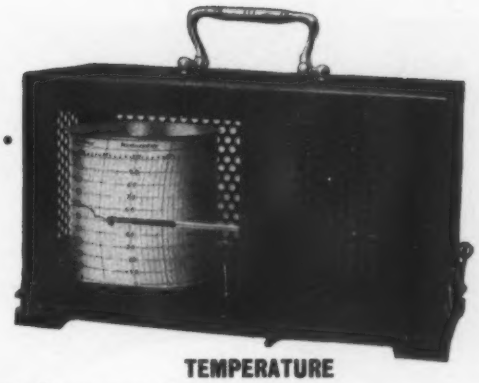
Seven 90 h.p. 14-ton flameproof battery locomotives (type DBF12) ordered by the National Coal Board (East Midlands Division) are now in service in Maltby colliery. Two similar locomotives for Rothes colliery (Scottish Division) were completed during the year, and orders received for a further six for Bilston Glen colliery (Scottish Division).

Three sets of Atlas mining locomotive electrical equipments have been delivered to William Neill for Norway.

One of the more interesting orders received for vertically isolated type VH switchgear is that received from the Selection Trust for the Mufulira West Copper Mine, Northern Rhodesia, which includes twenty-nine 11-kV 350-MVA type V22H units with compound-filled double busbars. The units will be arranged in "U" formation to provide maximum visibility for instruments and meters. Also for the Selection Trust are a thirteen-panel, 11-kV 250-MVA type V1H2R switchboard for equipping a new smelter substation and twenty-five 3.3-kV 150-MVA type V1H2R units for supply control to a new shaft — both for the Roan Antelope Copper Mines.

Several 11-kV air-break reversing contactors are now in mining service. Construction has progressed on the equipments with the latest closed-loop control scheme for Ward-Leonard winder drives. None has yet been commissioned (except proven test equipment) owing to site work not being sufficiently far advanced. Several complicated mine-car handling plants have been commissioned during the year.

Make the state of your AIR *apparent*.....



HUMIDITY

With an S&M 3804 Whirling Hygrometer you can pin-point the humidity in one minute. Wet and dry bulb thermometer tubes, ranged 20° to 120°F. Our No. 3805 Hygro-rule is a valuable time saver for ascertaining the R.H.

To chart daily or weekly records, use the S&M Hair Hygrograph 2362. Range 0 to 100% R.H. in 2% divisions. Slightly larger than Thermograph above.

TEMPERATURE

The No. 2342 Thermograph (above) is for charting daily or weekly records. Simple and accurate; in many different ranges. 10" x 5" x 5½".
For simple temperature readings, use the S&M 3745 Thermometer. Readable from 10 ft., it has a white vitreous enamelled scale, bold figures and gradations and *magnifying lens tube*. Red permacolor fluid. 12½" long.

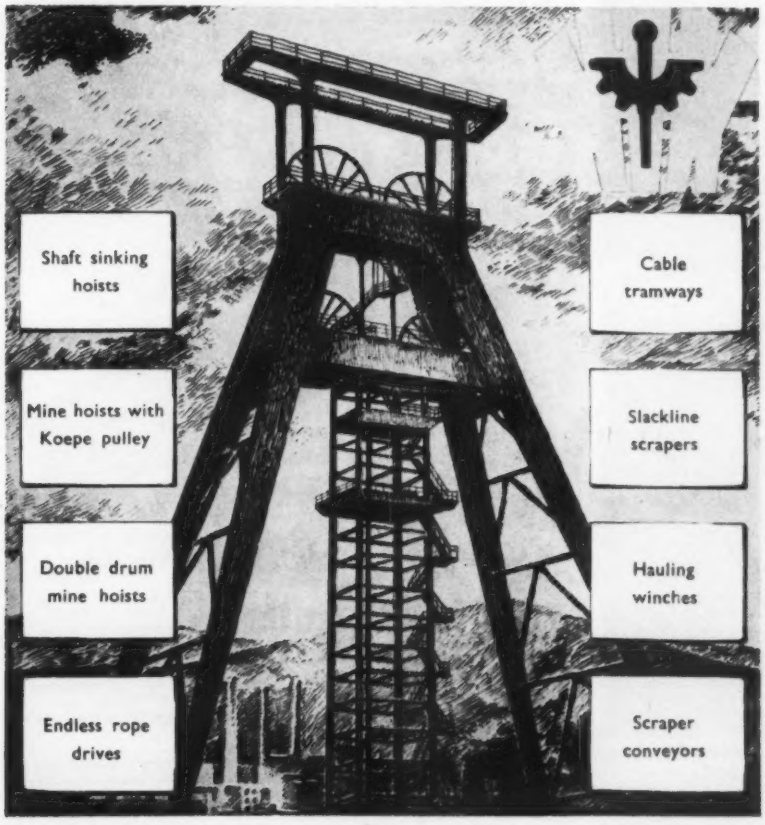
SPEED

Measuring air flow is easy with S&M Anemometers; vane revs. are registered on dial. Light, medium and high speed ranges, all models fitted with high-grade movements, and most having disconnector, zero-setting and correction charts in leather case. This is No. 3150, for high speeds up to 10,000 ft. per minute.

whatever your business, we have your measure

SHORT & MASON LTD

Aneroid Works, 280 Wood Street, Walthamstow, London, E.17



EXPORTED BY:

NIKEX

HUNGARIAN FOREIGN TRADING COMPANY

for the Products of the Heavy Industry

★

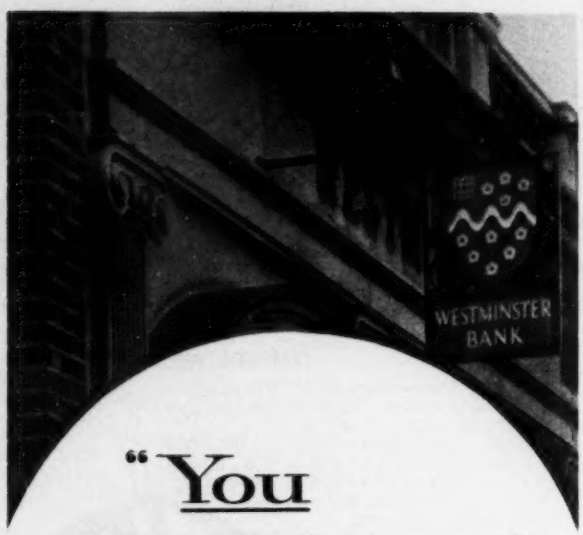
Postal Address:

Budapest 4, POB. 103

HUNGARY

Cable Address:

NIKEXPORT

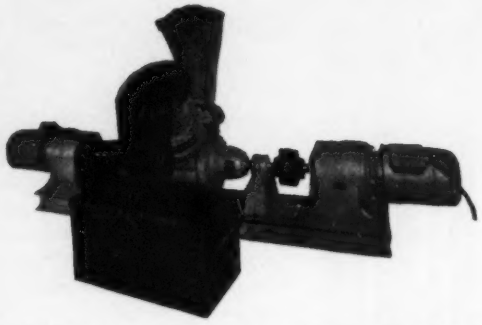


"You should bank with the Westminster too!"

WESTMINSTER BANK LIMITED, HEAD OFFICE: 41, LOTHBURY, LONDON, E.C.2
and 1,200 branches throughout England and Wales

COMET

POWERFUL, POSITIVE-ACTION, SLOW-REVVING PUMPS



A 4" heavy duty pump, driven simultaneously at each end by two 3 h.p. synchronised motors used for such applications as pumping liquorice, tar, soap, etc.

THE COMET PUMP & ENGINEERING COMPANY, LIMITED
JOHNSON ROAD, WEST CROYDON
Telegrams: Comet, Croydon. *Telephone:* Thornton Heath 3816

Hundreds of Trades & Professions have a use for them

AND NOW THEY'RE HERE AGAIN

NESTLER
SLIDE RULES
MADE IN GERMANY)

The ONLY Slide Rules WITH ALL THESE SIX GREAT ADVANTAGES

★ Engine divided—durable—non-wearing.
★ Body spring loaded against the slide.
★ Colourfast — cannot change colour with age.
★ Unbreakable — long life expectancy.
★ Bevel of body utilised as scale—may be used for pencil or ink layout.
★ New ineffaceable constant value table on plastic label inlet on the reverse side assures good legibility

Obtainable from Drawing Office Dealers and High-class Stationers

STUDENT MODELS
ACCURATE
EFFICIENT

The student models are slightly cheaper and splendid for all student purposes.

In case of difficulty apply:-
W. PATTERSON & Co. Ltd.,
BECKENHAM, KENT

NESTLER MEANS PRECISION

Metal and Mineral Trades

A. STRAUSS & CO. LTD.

FOUNDED 1875

PLANTATION HOUSE, MINCING LANE, LONDON, E.C.3

METALS
Telephone: Mincing Lane 5551 (10 lines)
Telegrams: Straussar Phone London

Telex GB LN 28858

RUBBER
Telephone: Mansion House 9082 (3 lines)
Telegrams: Ascorub Phone London

MERCHANTS **EXPORTERS** **IMPORTERS**

Non-Ferrous Metals — Virgin, Alloys, Scrap
RUBBER COPPER REFINERS

Members of the London Metal Exchange
Dealer Members of the Rubber Trade Association
Members of the National Association of Non-Ferrous Scrap Metal Merchants

EVERITT & Co. LTD.

40 CHAPEL STREET
LIVERPOOL
Teleg. Address: Persistent, Liverpool Phone: 2995 Central

SPECIALITY:
MANGANESE PEROXIDE ORES

We are buyers of:
WOLFRAM, SCHEELITE, VANADIUM, MOLYBDENITE, ILMENITE, RUTILE, ZIRCONIUM and TANTALITE ORES

Suppliers of:
FERRO-ALLOYS & METALS, NON-FERROUS ALLOYS

BLACKWELLS FOR ALLOYS

Buyers and consumers of
- COLUMBITE
- TANTALITE
- TUNGSTEN
- MANGANESE

Makers of FERRO ALLOYS, NON-FERROUS ALLOYS
RARE METALS
BLACKWELL'S METALLURGICAL WORKS
THERMETAL HOUSE, GARSTON, LIVERPOOL, 19
Telephone: Garston 980 Telegrams: Blackwell, Liverpool

Telegrams: "BASSETT" PHONE, LONDON.
Telephone: MANSION HOUSE 4401/3.

BASSETT SMITH & Co. Ltd.

(Incorporating George Smith & Son)
15/18 LIME ST., LONDON, E.C.3

METALS,
ORES (Copper, Zinc, Lead, &c., Complex),
RESIDUES, SKIMMINGS & ASHES
NON-FERROUS SCRAP

Telephone: HOP. 5941-3
Cables: AYRTONMET
Telex: LONDON 2-2475

AYRTON METALS LIMITED

(Members of the London Metal Exchange)
IMPERIAL HOUSE, DOMINION STREET, LONDON, E.C.2
IMPORTERS AND EXPORTERS OF
NON-FERROUS VIRGIN METALS, SCRAP, ALLOYS, ORES, MINERALS AND BY-PRODUCTS
containing
BASE AND PRECIOUS METALS
DEALERS IN PLATINUM GROUP METALS
ADVANCES MADE AGAINST CONSIGNMENTS
U.S. Agents
The Ayrton Metal & Ore Cpn., 30 Rockefeller Plaza, New York 20, N.Y

Cable Address: WAHCHANG, NEW YORK

WAH CHANG CORPORATION

(FORMERLY WAH CHANG TRADING CORPORATION
233 BROADWAY - - NEW YORK 7, NEW YORK

TUNGSTEN TIN

BUYERS
Tungsten Concentrates, Tungsten Tin Concentrates
Mixed Tungsten Ores
Tungsten Tailings, Scrap, Tips, Grindings
Tin Concentrates—Tin Dross, Tin Furnace Bottoms

SELLERS
Tungsten Concentrates to Buyers' Specifications
Tungsten Salts, Tungsten Powder
Tungsten Rods and Wires
Tungsten Ingots, Tin Oxides, Tin Chlorides

PLANT — GLEN COVE, NEW YORK

GEORGE T. HOLLOWAY
& CO. LTD.

METALLURGISTS & ASSAYERS,
ORE TESTING, WORKS AND
METALLURGICAL RESEARCH LABORATORIES

Atlas Road, Victoria Road, Acton,
LONDON, N.W.10

Telephone No.: ELGAR 5202
Tels. & Cables: NEOLITHIC LONDON

ROURA & FORGAS, LTD. Telephone No: GERRARD 9641

Sole Sterling Area Suppliers of

ITALIAN QUICKSILVER

COLQUHOUN HOUSE,
27/37 BROADWICK STREET, LONDON, W.1

RHONDDA METAL CO. LTD.
1 HAY HILL, BERKELEY, SQ., LONDON, S.W.1:
Works: PORTH GLAM.
PHOSPHOR COPPER,
PHOSPHOR BRONZE, LEAD BRONZE,
GUNMETAL, BRASS
Telephone: MAYFAIR 4654 Cables RONDAMET

J. LOWENSTEIN & CO. LTD.
GREENWICH HOUSE,
10/13 NEWGATE STREET, LONDON, E.C.1
Telephone: City 8401 (7 lines)
ORES - METALS - RESIDUES

MINING & CHEMICAL PRODUCTS LIMITED

86 Strand
London WC2
Telephone
Covent Garden
3393

Buyers of Ores,
Concentrates
and Residues of

BISMUTH
INDIUM
SELENIUM

WORLD-WIDE SERVICE

DANIEL C.
GRIFFITH
& CO.
ASSAYERS
TO THE BANK OF ENGLAND
27/33, PAUL STREET,
LONDON, E.C.2.

Branch Office: LEFKA, Cyprus

Also at: BRISTOL, BIRMINGHAM, GLASGOW, HULL, LIVERPOOL, NEWCASTLE, S. WALES

Analytical Chemists, Samplers, Technical representatives in sales of Ores & Metals at all Ports and Works.

Analyses of
PRECIOUS METALS
RARE EARTHS
BASE METALS
ORES & RESIDUES
Etc.

Also in: BELGIUM, CANADA, FRANCE, GERMANY, HOLLAND, ITALY, PORTUGAL, SPAIN, SWEDEN, SWITZERLAND, U.S.A.

Telephone: MONARCH 1314 (3 lines)
Telegraphic Address: "GRYFFYDD, LONDON."

BARNET METAL CO., LTD.
Elektron House, Brookhill Road, New Barnet, Herts.
Phone: Barnet 5187 and 3901
STOCKISTS OF: Aluminium, Brass and Copper
BUYERS OF: all non-ferrous scrap
The RIGHT firm to deal with

Telegrams: Nonfermet Telex, London	Cables: Nonfeamet London	Telephone: Mansion House 4521	International Telex London 8547

HENRY GARDNER & CO. LTD.

Non-Ferrous Metals
and Semi-Manufactures,
Ores, Minerals and Residues,
Rubber
Iron and Steel
and General Merchandise

2 METAL EXCHANGE BUILDINGS,
LONDON, E.C.3
and at BIRMINGHAM, MANCHESTER and GLASGOW

THE CHROME COMPANY LTD.

Rhodesian and Transvaal Chrome Ores

Metallurgical
Refractory and
Chemical Grades

AVAILABLE FOR PROMPT SHIPMENT

103 MOUNT STREET • LONDON • W.1.

Telephone	*Telegrams*	*Telex*
HYDE PARK 9951	ORECOS LONDON	ORECOS LONDON 2-3290

THE STRAITS TRADING COMPANY LIMITED

P.O. Box 700, OCEAN BUILDING, SINGAPORE

Works: SINGAPORE & PENANG

STRAITS REFINED TIN

— "THE STRAITS TRADING CO. LTD." BRAND —

THE BRITISH TIN SMELTING CO. LTD., LIVERPOOL

•

London Agents:

W. E. MOULSDALE & CO. LTD., 2 Chantrey House, Eccleston Street, S.W.1

The Mining Journal

ANNUAL REVIEW — 1958 EDITION

Summarizes events and statistics of 1957

Ready in May — Price 15/-

Orders may be placed through Newsagents or sent direct to :-

THE PUBLISHER, The Mining Journal,
15 Wilson Street, Moorgate, London, E.C.2

"Tropag"

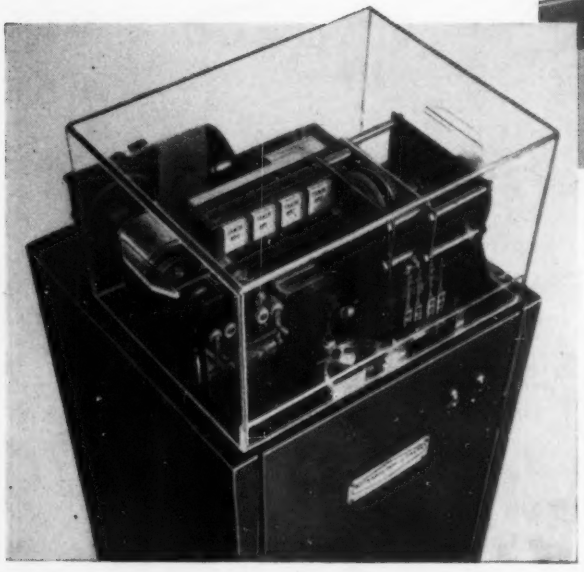
ASBEST-& ERZIMPORT OSCAR H. RITTER K. G.
Hamburg :—: Ballindamm 7

ASBESTOS - ORES - MINERALS

Import Export Transit

Recorded signals
HELP TO CUT ACCIDENTS

With the 'Aspinall' mine signal recorder a complete check can be maintained on all signals exchanged between any number of sources up to eight. The instrument provides a printed record–including time of transmission of all signals exchanged; so that operating irregularities are immediately revealed. The system establishes responsibility, shows if, when and how time is wasted and helps to reduce accidents. Full details are given in publication 747/27, copies of which are available on request.



THE 'ASPINALL' MINE SIGNAL RECORDER
is neat and compact. No special cabling is required, the instrument being connected to the terminals of the existing mine signalling system.

METROPOLITAN-VICKERS
ELECTRICAL CO LTD TRAFFORD PARK MANCHESTER 17

An A.E.I. Company

LEADING ELECTRICAL PROGRESS IN MINES
C/M 707

Published by The Mining Journal Ltd., 15 Wilson Street, Moorgate, London, E.C.2, and printed by Washburn & Sons Ltd., Queens Road, Southend-on-Sea, Essex. Registered as a Newspaper